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THE EFFECTS OF STUDENT REACTIONS TO TEACHING METHODS.

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STUDENT ACHIEVEMENT AND ATTITUDE TOWARD SCHOOL SUBJECTS WERE STUDIED IN RELATION TO TEACHER FEEDBACK AND TEACHER ATTITUDE. THE STUDY SAMPLE CONSISTED OF 10TH GRADERS AND TEACHERS FROM 14 HIGH SCHOOLS. FIVE TREATMENTS OF TEACHER FEEDBACK WERE IMPLEMENTED AND EVALUATED--(1) STUDENT RATINGS OF TEACHERS WERE SENT TO THE TEACHERS BY MAIL SEVERAL TIMES DURING AN ACADEMIC YEAR, (2) FINDINGS OF TRAINED OBSERVERS OF SIX RECORDED CLASSROOM SESSIONS DURING AN ACADEMIC YEAR WERE MAILED TO THE TEACHERS, (3) FINDINGS OF THREE RECORDED SESSIONS WERE MAILED TO THE TEACHERS, (4) ONLY RESULTS OF STUDENT ACHIEVEMENT AND ATTITUDE PRETESTS WERE MAILED TO THE TEACHERS (HALF OF THE TEACHERS IN EACH OF THE FIRST THREE TREATMENTS ALSO RECEIVED THESE DATA), AND (5) NO FEEDBACK WAS SENT. NO STATISTICALLY SIGNIFICANT DIFFERENCES WERE FOUND BETWEEN ACHIEVEMENT OR ATTITUDINAL MEANS. MOST TEACHERS RECEIVING FEEDBACK INDICATED THE NEED FOR MORE INSERVICE TRAINING AND FACE-TO-FACE FEEDBACK RATHER THAN ONLY WRITTEN FEEDBACK BY MAIL. (RS)

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THE EFFECTS OF STUDENT REACTIONS TO TEACHING METHODS

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TABLE OF CONTENTS

ACKNOWLEDGEMENTS iii

INTRODUCTION 1

METHOD 8

RESULTS 14

DISCUSSION 22

CONCLUSIONS AND IMPLICATIONS 23

SUMMARY 24

REFERENCES 25

APPENDIXES

A. Interaction Analysis: A Program for Interpretation of Matrices
B. Hayes Pupil-Teacher Reaction Scale
C. Rationale for Pupil Teacher Rating
D. Pupil-Teacher Rating - Can It Help You?
E. Interaction Analysis Feedback
F. To Teachers Selected To Receive Pre-Test Results
G. Interaction Analysis - Can It Help You?
H. Statistical Data and Analysis
I. Teacher Reactions

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INTRODUCTION

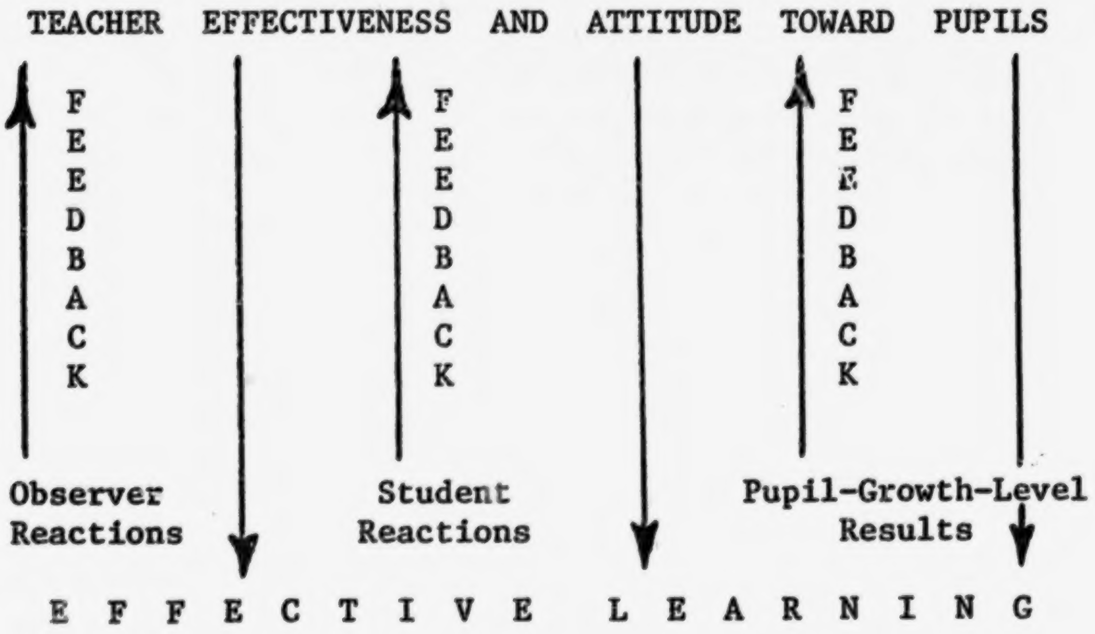
THE PROBLEM

How can the quality of education be improved? Quality education is defined here as teaching and learning which results in optimum student achievement and student attitude toward school subjects.

The major assumptions in this study were:

1. Teaching and learning require effective interaction between teacher and students.
2. Quality education greatly depends on teacher performance in the classroom.
3. Teacher effectiveness may be improved through organized feedback to teachers of observer ratings and pupil ratings of the teaching process.

The above assumptions were the bases for the major hypothesis of this study. This hypothesis was that by increasing and systematizing feedback to teachers, the teaching process will be improved with the result that student learning will increase. Accordingly, the following paradigm was tested:


TEACHER EFFECTIVENESS AND ATTITUDE TOWARD PUPILS
FEEDBACK
FEEDBACK
FEEDBACK
Observer Reactions
Student Reactions
Pupil-Growth-Level Results
EFFECTIVE LEARNING

This study attempted to determine which of three types of feedback to teachers might result in a significant difference in student achievement and attitude toward courses of study.

OBJECTIVES

The general objectives were to determine if student achievement and student attitude toward school subjects:

1. Can be improved significantly by systematically increasing feedback to teachers concerning pupil reaction to their teaching.
2. Can be improved significantly by systematically increasing feedback to teachers concerning reaction of trained observers to their teaching.
3. Are significantly correlated with attitude of teachers toward their pupils.

RELATED RESEARCH

Kinhart (42) found that pupils of teachers who received ten hours of supervision did significantly better school work than pupils whose teachers were without supervision. Ten hours per month per teacher is costly. What is the minimum hours of teacher supervision which will make a significant difference in student growth?

Costs of improving the quality of education could be reduced even further if significant improvement in student growth could be effected through pupil-teacher rating and feedback of results to teachers. Gage, Chatterjee and Runkel (40) found that sixth-grade teachers will modify their teaching in the light of pupil rating if feedback of these ratings is given to the teachers. If feedback of pupil reaction to the teaching of their teachers has as beneficial a result as feedback of observer ratings, then a considerable savings could be made in both time and money.

Will high school teachers in various subject areas modify their teaching as a result of feedback of pupil ratings of their classroom performance? Will such modification of teaching significantly improve pupil achievement and attitudes?

The valuable work of Gage and others suggests additional research. A better pupil-teacher rating scale may be needed since only four out of twelve items produced a statistically significant difference between teachers who received feedback and those who did not in the Gage Study. The Gage Study also suggested that a longer interval than 53 days may be needed between feedback of rating results and re-rating. The Gage Study did not include pupil achievement and pupil attitude toward subject with the experimental treatment.

There is evidence that students are honest, reliable raters of teachers and that students can furnish valuable evidence even though they are not experts on teaching. Bryan (5) cites studies of student ratings with reliability coefficients ranging from .64 to .99 with an increase in reliability as the studies move from the college level to the intermediate elementary level.

Leeds (30) found that 100 teacher-pupil inventory scores correlated as follows:

.43 with ratings by their principals.
.49 with ratings by Leeds.
.45 with ratings by their students.

Evidence of validity of pupil ratings is that such ratings have correlated as follows with principals ratings for the same teachers:

.60 with discipline ratings.
.70 with teacher-pupil relations.
.40 with ability to encourage learning (37).

Starrak discovered that the opinions of students and of three faculty experts agreed 75 per cent of the time (35). Druckers and Remmers found that alumni rate their former teachers similarly to when, as students, they had rated the same teachers (24).

At Brooklyn College no appreciable differences in instructors' scores were found to exist because of course grades received by students (6,681), size of classes, sex of students, college year, or whether or not the course was elective (26). Remmers (34) and Hudelson (29) report low correlation coefficients (.07 and .19 respectively) between student ratings of college instructors and student grades received from their instructors. It appears that students, if approached properly, are honest, reliable raters of their teachers.

Remmers also says: "If 25 or more student ratings are averaged, they are as reliable as the better educational and mental tests at present available." (15) In this experiment the teachers were given their average ratings by item and for the total score.

A great number of pupil-teacher rating instruments have been devised and are of value but it is indicated that a more satisfactory instrument is needed. Barr has examined many investigations of teaching efficiency of the past several decades and has found that insufficient attention has been paid to "...The particulars of teaching..." (22) and the relationship between teacher and student (23). Those devising teacher-rating instruments seem to have ignored the unidimensional scalogram technique. Yet McNemar conceded as early as 1946 that a scale devised by this technique has "...superiority on the single dimension problem..." (32)

A unidimensional scale places each item along a single continuum similar to the inches of a yardstick. Each total score tells which items were reacted to favorably and which were reacted to unfavorably. Intensity analysis can be used to determine which score represents a dividing line between favorable and unfavorable attitudes. A satisfactory unidimensional scale is derived from the universe of attributes which define the concept and have a common content.

Since there was evidence that the Hayes Pupil-Teacher Reaction Scale may be unidimensional, it was used in this study. Several administrations and successive refinements in 1960 of the Hayes Scale indicated that there are certain desirable behaviors which are generally characteristic of poor teachers (41).

In 1961 a follow-up study (28) with the Hayes instrument resulted in what appears to be a unidimensional instrument to measure attitude of students toward the teaching effectiveness of their teachers. The average coefficient of reproducibility was .93 for five instructors and 660 student raters. This average coefficient of reproducibility of .93 was an improvement of .22 over the average minimum modal reproducibility. Intensity analysis for all 660 ratings indicated that an attitude content score of five was the fixed zero point dividing favorable from unfavorable attitudes. The attitudinal items were consistently rank ordered along a single continuum with the item marginals or proportions giving the favorable response ranging from .26 to .93.

In the preceding study internal validity was established by adding eight statements ranging from "This instructor is the very best I've ever had" to "This instructor is the worst I've ever had." The coefficients of correlation between scores on these eight statements and the scores for the attitude statements were:

Instructor	r	Number of Raters
A	.93	112
B	.85	147
C	.70	176
D	.81	139
E	.65	86

In view of the advantages of a unidimensional scale that concentrates on classroom teaching it was considered desirable to use the Hayes Scale in this study.

Research on improvement of teaching indicates that teachers be observed while they teach. Medley and Mitzell note: "Certainly there is no more obvious approach to research on teaching than direct observation of the behavior of teachers while they teach and pupils while they learn. Yet it is a rare study indeed that includes any formal observation at all." (14)

Ryans offers this pertinent advice:

> Of the measurement approaches employing observation and assessment of teacher behavior in process only time sampling involving replicated systematic observation by trained observers produces sufficiently reliable data to recommend its use in fundamental research...the chief shortcoming of observation and assessment techniques has been lack of reliability, a shortcoming which recent research has indicated can fairly readily be overcome with care in definition and scale development, and with training of the observers or judges (16).

Medley and Mitzell point out that validity of measurement of behavior depends on:

1. A representative sample of the behaviors to be measured must be observed.
2. An accurate record of the observed behaviors must be obtained.
3. The records must be scored so as to faithfully reflect differences in behavior (14).

Medley and Mitzell's review of research and their own research led them to the conclusion that teacher observation should be separated from quantified rating. Since Anderson's (21) pioneer work, others such as Bales, (2) Bush, (10) Thelen, (19) Withall, (38) Lewis, (31) Flanders, (39) and Amidon (20) have investigated student-teacher interaction as a determiner of effective teaching.

The basic Flanders system involves ten categories for recording teacher-pupil-verbal-response behavior in the classroom. Every three seconds the observer writes down the category number of the interaction he has just observed. These numbers are recorded in sequence in a column and after the class are easily quantified into a matrix which provided insight into the teaching process. "With the use of this recording procedure it is possible to assess the degree to which a teacher is meeting the social-emotional, as well as the intellectual, needs of the pupils." (4)

The Flanders instrument has been successfully field tested with 900 students, half in seventh-grade social studies and half in eighth-grade geometry. It was found that "...in both content areas the students of the more indirect teachers scored higher on achievement tests than did students of the more direct teachers." (1) It also found that the more flexible teachers who could shift readily from direct to indirect and vice versa approaches had more success improving student achievement than did teachers with less flexibility in their classroom behavior. In view of the foregoing conclusion the Flanders system was selected for use in this study.

The effect of feedback to teachers needs to be measured against the criterion of measured pupil gain, or end product. While a second rating after an appropriate interval subsequent to feedback may reflect change in the teaching process, a primary criterion should be end product student measurement versus premeasurement. As Bloom (3) insists, "The research worker who wishes to understand teaching and teachers must understand not only the teaching and education process as it takes place but also the outcomes or effects of the process - the change that takes place in the learners..."

The Iowa Tests of Educational Development were selected to measure achievement. The average reliability of these tests is .91. Henry Chauncey had this to say about an earlier version of these tests: "...this program of tests is probably the best conceived and executed battery that is available for use in the senior high school..." (7) Several years later Eric F. Gardner said: "As measures of certain broad aspects of the pupil's educational development they are definitely superior tests." (8) More recently J. Murray Lee comments: "Lindquist, his associates and the publisher should be highly commended for the careful construction and standardization of the tests..." (9)

Remmers' A Scale to Measure Attitude Toward Any School Subject was selected to measure pupil attitude in this area. The scale consists of seventeen items and columns for each subject so that students can indicate their attitudes by plus signs. Bonney and Hampleman in commenting on this scale say: "It may be assumed that students' attitudes toward their school subjects are good indexes of group morale in these respective classes." (9) Newcomb commends Remmers for "...using clear and simple language in his scaled statements..." (6)

The investigator also felt the need to attempt to measure the attitude of teachers toward their pupils. Does rating feedback affect the way teachers feel toward pupils? Do classes which make the greatest gains have teachers whose attitude toward them as pupils is most favorable?

The Minnesota Teacher Attitude Inventory was selected to evaluate teacher-pupil relations. Persons scoring high on this inventory tend to be better teachers than persons scoring low. Dwight L. Arnold states:

> Two studies of validity were made; these studies yielded coefficients of correlation of .46 and .60 between the scores on the test and the three criteria: principal's estimate, pupil's rating, and visiting experts rating. Consistent and thorough work has gone into construction and validation of this inventory. Clearly this represents a serious attempt on a very important and very difficult problem...It deserves... extensive use in research. (8)

Lee J. Cronbach also comments:

> Test development of exceptional quality lies behind this inventory. Publication was preceded by patient and careful research which is welll reported in the manual...The Minnesota Teacher Attitude Inventory is a promising tool for research on teacher success... (8)

This study followed the recommendation of Ryans that studies be made "...of the influence of different in-service experiences of teachers..." (17) It attempted to answer criticism that educational research rarely seeks to improve the structure of what goes on in the classroom (13). This study accepted the advice of those who say: "...it is with respect to the teaching process itself that the greatest potentiality for research lies.. ." (33) This study was aimed at "doing something to change conditions rather than merely measuring and correlating them." (25)

METHOD

GENERAL DESIGN

Different kinds and amounts of feedback to teachers were used in an attempt to improve the teaching process and thereby improve pupil growth (paradigm on page one, this report). The independent variables were the various types of feedback to teachers. The dependent, criterion variables were: (1) end-of-year ratings and observations of teachers, (2) end-of-year teacher attitudes toward pupils, (3) end-of-year pupil achievement on standardized tests, and (4) end-of-year pupil attitude toward school subjects. The design may be diagrammed as follows:

$$\begin{array}{cccc} R & O_1 & X_1 & O_2 \\ R & O_3 & X_2 & O_4 \\ R & O_5 & X_3 & O_6 \\ R & O_7 & X_4 & O_8 \\ R & O_9 & & O_{10} \end{array}$$

In the above, R indicates random assignment of teachers and classes to one of four treatments and a control group. O_1, O_3, O_5, O_7, and O_9 indicates pre-measurement of achievement and attitude. X_1, X_2, X_3, and X_4, represent treatment conditions while O_2, O_4, O_6, O_8, and O_{10} represent post-tests for achievement and attitude.

POPULATION AND SAMPLE

The typical Pennsylvania high school is similar to the typical American public high school. The typical American public high school has less than 100 seniors; 45% of Pennsylvania's high schools have less than 100 seniors. The average American school system spends $532.00 per pupil (in average daily attendance) while the average school system in Pennsylvania spends $565.00 per pupil. The average salary of the classroom teacher is $6,500. in the United States while the same average in Pennsylvania is $6,410.. The average high school class in the United States has approximately 23 pupils compared to 20 secondary pupils per class in Pennsylvania. In America the average school building is about 24 years old while in Pennsylvania this average is about 30 years old. About 10 per cent of the tenth-grade students drop out of school in both Pennsylvania and the nation. The average per capita personal income in 1964 for the United States was $2,500. while $2,575. was the case for Pennsylvania. In many respects the typical Pennsylvania high school represents the typical American public high school.

In April of 1964 the 691 high schools of Pennsylvania with graduation classes were asked if they wished to participate in an experiment to improve teaching and learning. These schools were sent a four page summary of the proposed study. The 210 schools which replied favorably were spread over a wide range by size and per pupil expenditure. To limit problems of coordination and socio-economic differences, it was decided to select from 53 volunteering schools in south-central Pennsylvania serving rural neighborhoods containing no town of more than 8,000 people. From these 53 schools a random sample of 14 schools were selected with stratification of the sample by size and per pupil expenditure.

The 14 selected high schools ranged in size from a school with a graduating class of 70 to one of 264. The percent of high school graduates going on to college ranged from 16 to 34 per cent in this sample of schools, while the average cost of instruction per pupil ranged from $315.00 to $506.00.

To decrease problems of control and testing, this study was limited to one grade. The tenth-grade was selected because: (1) many students do not make much improvement in their scores on standardized English tests in high school subsequent to the tenth-grade and (2) comparatively few students drop out of school in Pennsylvania prior to the tenth-grade since school attendance is mandatory until age 17 unless a special work permit is approved.

The four major subject areas of English, mathematics, science, and social studies were included to determine if feedback would work equally well with teachers of different courses. No special education classes for children of limited ability were included. In the 14 randomly selected high schools, there were a total of 31 English teachers, 39 mathematics teachers, 27 science teachers, and 25 social studies teachers. Twenty teachers from each of the four subject areas were randomly selected for the study and then randomly assigned as follows:

Treatment	Number of Teachers by Subjects				
	English	Math	Science	Social Studies	Total
1	4	4	4	4	16
2	4	4	4	4	16
3	4	4	4	4	16
4	4	4	4	4	16
5	4	4	4	4	16
Totals	20	20	20	20	80

The random selection of the teachers was stratified by teacher salaries so that for each subject and for each treatment, one teacher was assigned from each of the following salary classifications: $4500 - $5199, $5200 - $5899, $5900 - $6499, and $6500 - 7400. This stratification by salaries also resulted in a reasonably good distribution of years of teaching experience among treatments since in this study teaching experience and salaries correlated .72.

The total number of involved pupils was 2,186. This number sub-divided as follows: 471 in treatment 1, 439 in treatment 2, 464 in treatment 3, 410 in treatment 4, and 402 in treatment 5.

The average I.Q. for the entire population was 110.94 on the Science Research Associates Test of Educational Ability. The mean I.Q.'s for the 80 classes ranged from 91.79 to 129.25 with no significant differences among treatments or course subjects.

Pupils could not be assigned randomly to treatments due to administrative difficulties. Entire classes were randomly selected from those taught by teachers who had been randomly selected and randomly assigned to treatments. Therefore class means were considered as the basic observations for determining degrees of freedom and analyzing achievement data.

TESTING PROGRAM

On August 30, 1965, the guidance counselors from the 14 involved high schools attended an orientation meeting in the Pennsylvania Department of Public Instruction where adherence to standardized test directions and time limitations was stressed. During the third week of school these guidance counselors administered the following: (1) the Remmers Scale to Measure Attitude Toward Any School Subject, (2) Test of Educational

Ability (Science Research Associates), and (3) Form X-4, Iowa Tests of Educational Development. During the first week of May, Form Y-4, Iowa Tests of Educational Development were administered as a post-test. The Remmers Scale to Measure Attitude Toward Any School Subject was administered during April as another post-measurement.

IN SERVICE EDUCATION

During the second and third weeks of July 1965, the principal investigator and a co-investigator explained the study during visits to chief school administrators and high school principals of the 14 selected schools. On Saturday, September 18, 1965, all of the involved 80 teachers attended an orientation meeting in the Department of Public Instruction. During this orientation meeting the following was done: (1) teachers completed the Minnesota Teacher Attitude Inventory, (2) the purpose and procedures of the study were explained by the principal investigator, (3) teachers worked a programmed learning approach to Flanders interaction analysis (Appendix A), and (4) Dr. Edmund J. Amidon and Dr. Anita Simon of Temple University explained how teachers could use the results of the Flanders system.

TREATMENT 1

In treatment 1, students rated their teachers four times in the fall (between October 1 and December 22) and twice in the spring (between March 11 and April 28) using the Hayes Pupil-Teacher Reaction Scale (Appendix B). The fall ratings occurred three weeks apart. Feedback to teachers for the first two ratings occurred after the second rating, and on December 30, 1965, the teachers were given feedback for the last two fall ratings. Feedback included class frequencies and averages for the various items and was furnished by mail directly to the teachers concerned (Appendix C). On February 14, 1966, these teachers were mailed a summary of teacher ratings to date (Appendix D). On March 11, 1966, or 10 weeks subsequent to the second feedback on December 30, 1965, the first spring cycle of ratings began.

TREATMENT 2

In treatment 2, teachers were observed four times in the fall (between October 1 and December 22) and twice in the spring (between March 11 and April 28) by two carefully trained observers using Flanders 10 categories for interaction analysis. The two observers were trained for five days by Dr. Edmund J. Amidon and Dr. Anita Simon at Temple University. The observers continued to practice with tapes of teachers' lessons until they achieved a consistent inter-observer reliability of .85 before beginning classroom visitations. Both observers always observed together and their results were averaged for feedback to the teachers. Within several days of each observation, feedback was mailed to each teacher (Appendix E). The interval between the last fall feedback and the first spring observation was 10 weeks.

TREATMENT 3

Treatment 3 was the same as treatment 2 except that teachers were observed only twice in the fall (between October 1 and November 11) and once in the spring (between April 1 and April 28). The interval between the last fall feedback and spring observation was 20 weeks.

TREATMENT 4

The teachers in this treatment on October 26, 1965, were mailed: (1) average class ratings on the Remmers Scale to Measure Attitude Toward Any School Subject, (2) class rosters showing I.Q. and scores on the Iowa Tests of Educational Development (Appendix F).

TREATMENT 5

In treatment 5, there was no feedback of any type to teachers. However, in March, they were observed using interaction analysis and also rated by their pupils.

ADDITIONAL TREATMENT PROCEDURES

In treatments 2, 3, and 4, teachers were rated by their pupils with the Hayes Scale twice in the fall (between October 1 and November 11) and once in the spring (between April 1 and April 28) without feedback. In treatments 1 and 4, teachers were observed twice in the fall (between October 1 and November 11) and once in the spring (between April 1 and April 28) without feedback. In addition, one half of the teachers by subjects in treatments 1, 2, and 3 were randomly selected to receive pretest data for the Remmers Scale, the Iowa Tests of Educational Development (ITED), and the Test of Educational Ability (IQ). This data was mailed to these teachers on October 26, 1965 (Appendix F). On January 24, 1966, all teachers in treatments 2 and 3 were mailed a letter with the subject "Interaction Analysis - Can It Help You?" (Appendix G). In May 1966 the

the principals rated the teachers on a graduated scale ranging from a low of 1 and high of 5.

PROCEDURES FOR DATA ANALYSIS

Since intact classes had been assigned randomly to treatments, the class attitude and achievement means were used as the basic observations and treatment effects were tested against variations in these means (11). Either analysis of variance or covariance was employed to test for significance. In reporting class means in Appendix H, the first two class means listed for treatments 1, 2 and 3 represent classes whose teachers received pre-test data; these classes comprised sub-treatments within the first three treatments.

Cornell scalogram analysis (27) was performed for each cycle of ratings for the first nine items on the Hayes Pupil-Teacher Reaction Scale to determine the degree of unidimensionality of this instrument. Intensity analysis (18) was computed for the same items of this scale to determine the zero point dividing the population according to those with unfavorable and those with favorable attitudes toward the teaching of their teachers.

Coefficients of correlations were also computed between the various variables in this study.

TEACHER REACTIONS

To obtain reactions of teachers to written feedback reports, three questionnaires (Appendix I) were designed and administered in April, 1966. FORM I was designed for teachers who received feedback on teacher-pupil verbal interactions. FORM II was prepared for teachers who received feedback on the Hayes Pupil-Teacher Reaction Scale. FORM III was designed for teachers who received IQ results and September results on the ITED and Remmers Scale.

A follow-up interview with each teacher who received feedback was made in May, 1966. Essentially the same questions were asked again as a reliability check of the responses to the questionnaire and to permit clarification of teachers' reactions. Each interview was recorded on tape to assure accuracy in reporting. The responses obtained during the interviews are reported where there was disagreement between answers recorded on the questionnaires and those given by the teachers during the interview.

RESULTS

INTELLIGENCE

The class means for intelligence as measured by the Test of Educational Ability (published by Science Research Associates) are reported in Appendix H, Table 1. Classes in the first three treatments were divided into six sub-treatments. Teachers in three of the sub-treatments received pre-test feedback while teachers in the remaining three sub-treatments did not receive pre-test feedback. The first two means listed by subjects for treatments 1, 2, and 3 represent classes whose teachers received pre-test feedback. The foregoing procedure will be followed throughout Appendix H in recording class means. No significant differences in intelligence were found among either treatments or sub-treatments (Appendix H, Tables 2 and 3).

ACHIEVEMENT

Student Achievement was measured at the beginning and at the end of this study by the Iowa Tests of Educational Development (ITED). The ITED included the following: Test 1-Understanding Basic Social Concepts; Test 2-General Background in the Natural Sciences; Test 3-Correctness and Appropriateness of Expression; Test 4-Ability to do Quantitative Thinking; Test 5-Ability to Interpret Reading Materials in Social Studies; Test 6-Ability to Interpret Reading Materials in the Natural Sciences; Test 7-Ability to Interpret Library Materials; Test 8-General Vocabulary; Test 9-Use of Sources of Information. For each of the 80 classrooms a composite score for English was obtained by combining results on Tests 3, 7, 8, and 9. Mathematics was represented by Test 4 only. A composite science score for each classroom was obtained for Tests 2 and 6 and a composite social studies score was derived from Tests 1 and 5.

The pre- and post- composite class achievement means are shown in Appendix H, Tables 4, and 7. Analysis of variance (Appendix H, Tables 5, 6, 8, and 9) revealed no significant differences among these achievement means.

In addition when each ITED Test was examined separately no significant achievement differences were obtained.

STUDENT ATTITUDE TOWARD SCHOOL SUBJECTS

The pre-and post-test class attitude means were obtained from the Remmers Scale to Measure Attitude Toward Any School Subject (Appendix H, Tables 10 and 11). Analysis of variance indicated significant pre-test differences among subjects and for interaction (Appendix H, Tables 12 and 14) but no significant post-test differences (Appendix H, Tables 13 and 15).

The post-test class attitude means also were subjected to analysis of covariance, multiple classification, to equate the significant pre-experimental differences. The pre-test student attitude class means were used as the covariate. Analysis of covariance detected no significant differences at the .01 level in student attitude (Appendix H, Table 16).

STUDENT RATINGS OF THEIR TEACHERS

The class means for the first and last cycle of student ratings are listed in Appendix H, Table 17. Statistical analysis of these means is reported in Appendix H, Tables 18, 19, 20, and 21. No significant differences were obtained.

Cornell scalogram analysis was performed on the Hayes Pupil-Teacher Reaction Scale in this study. The response categories of the Hayes scale were dichotomized for scoring purposes prior to applying scalogram analysis. The justification for combining categories for scoring purposes was that verbal habits of people differ. The meaning of "extremely clear" to some is the equivalent of the meaning of "very clear" to others. These two categories could be combined for scoring purposes and given the weight of one. Likewise the meaning of "sometimes" might mean to some, what "seldom" means to others. These two categories could be combined and given a weight of zero.

The rule followed to combine response categories was to draw a line between the responses so as to minimize the number of pupils in the low group above the line and the number of pupils in the high group below the line (12). Item one was analyzed as follows.

Item	Original Weights	Low 25%	High 25%
This teacher makes the lesson clear in the first few minutes of class.			
a Always	3	20	310
b Usually	2	129	129
c Sometimes	1	228	8
d Seldom or Never	0	72	2

Pupil responses were scored first using the above weights. Then, based on total scores, the lowest 25% of the pupils and the highest 25% were determined. Next, categories were combined so that responses "a" and "b" were recorded as "1" and responses "c" and "d" were recorded as "0" for this item.

The same procedure was repeated for all items and the following scoring key resulted:

Item	Responses Scored as 1	Responses Scored as 0
1-4	a, b	c, d
5-6	a	b, c, d,
7-8	a, b	c, d
9	a	b, c, d,

The above key resulted in a maximum possible score of nine or a minimum score of zero in content for any one student.

Cornell scalogram analysis was then performed as follows (27):

1.--The IBM cards were arranged into rank order by total scores from high to low.

2.--A table was prepared with:
   a. One row for each person's score, using the rank order arrived at in step one above.
   b. One column for each category of each question.

3.--The responses of each person were indicated on the table by placing a check (✓) in the appropriate column for each item opposite the row representing the total score of that person.

4.--Then the frequencies for each category were totaled. The sum of the frequencies in both categories for each question had to equal the total number of subjects answering the questionnaire.

5.--Cutting points were placed for each item at the place in the rank order where the most common response changed from a favorable category to a non-favorable one. Cutting points were established to minimize error.

6.--The errors were totaled for each item using the cutting points to determine which responses fell outside the established patterns.

7.--The coefficient of reproducibility for each item was computed by dividing the number of errors (for that item) by the total number of subjects and subtracting the result from one.

8.--The marginals (per cent of people who answered each item favorably) were computed for each item.

Appendix H, Tables 22 and 23 show a sample of the coefficients of reproducibility and marginals resulting from scalogram analysis of the first two ratings in the fall.

The marginals or percentage of the items answered favorably ranged from .24 to .76 with an average marginal of .50 which indicated that spurious reproducibility was not introduced by extremely high or extremely low marginals. For example, item one had a marginal of .76 which meant that the coefficient of reproducibility could not be less than .76 for this item. The coefficient of reproducibility for this item was .89 which represents a sound difference.

Also the marginal for item eight was .24. This meant that the coefficient of reproducibility for this item could not fall below .76. It should be noted that a coefficient of reproducibility of .88 was obtained for this item. This represents a gain of .12 over the minimum obtainable reproducibility. The average minimum marginal reproducibility for all nine items was .63 which indicates that the average coefficient of reproducibility of .84 was not dependent on the marginals.

When intensity analysis was performed a zero point was found which divided the sample into those with favorable and those with unfavorable attitudes. At the beginning of the year the zero point was 1, while at the end of the year the zero point was 3 (Figures 1 and 2 on the following pages.

FIGURE 1
INTENSITY CURVE FOR FIRST AND
SECOND VISITATIONS

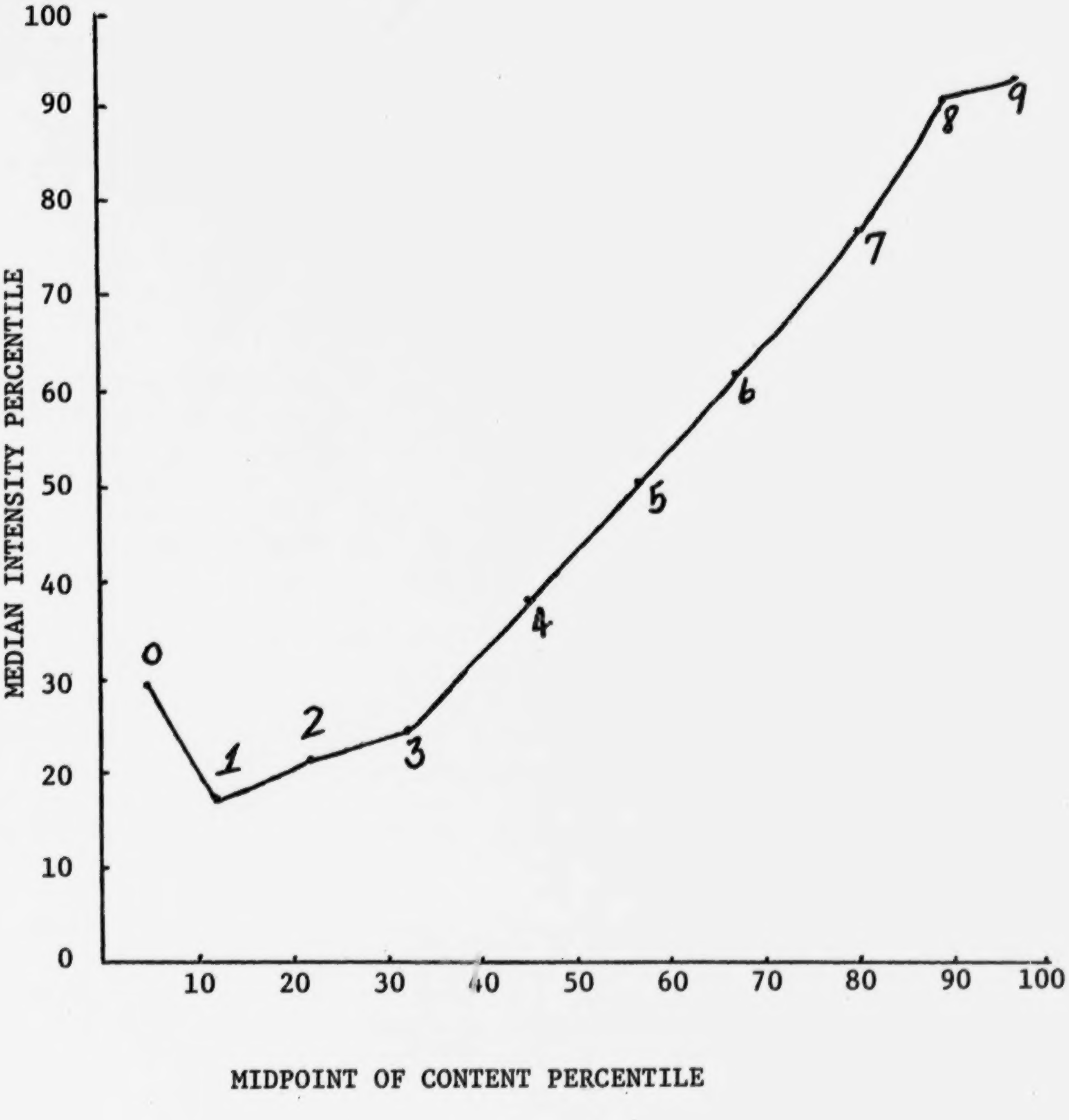
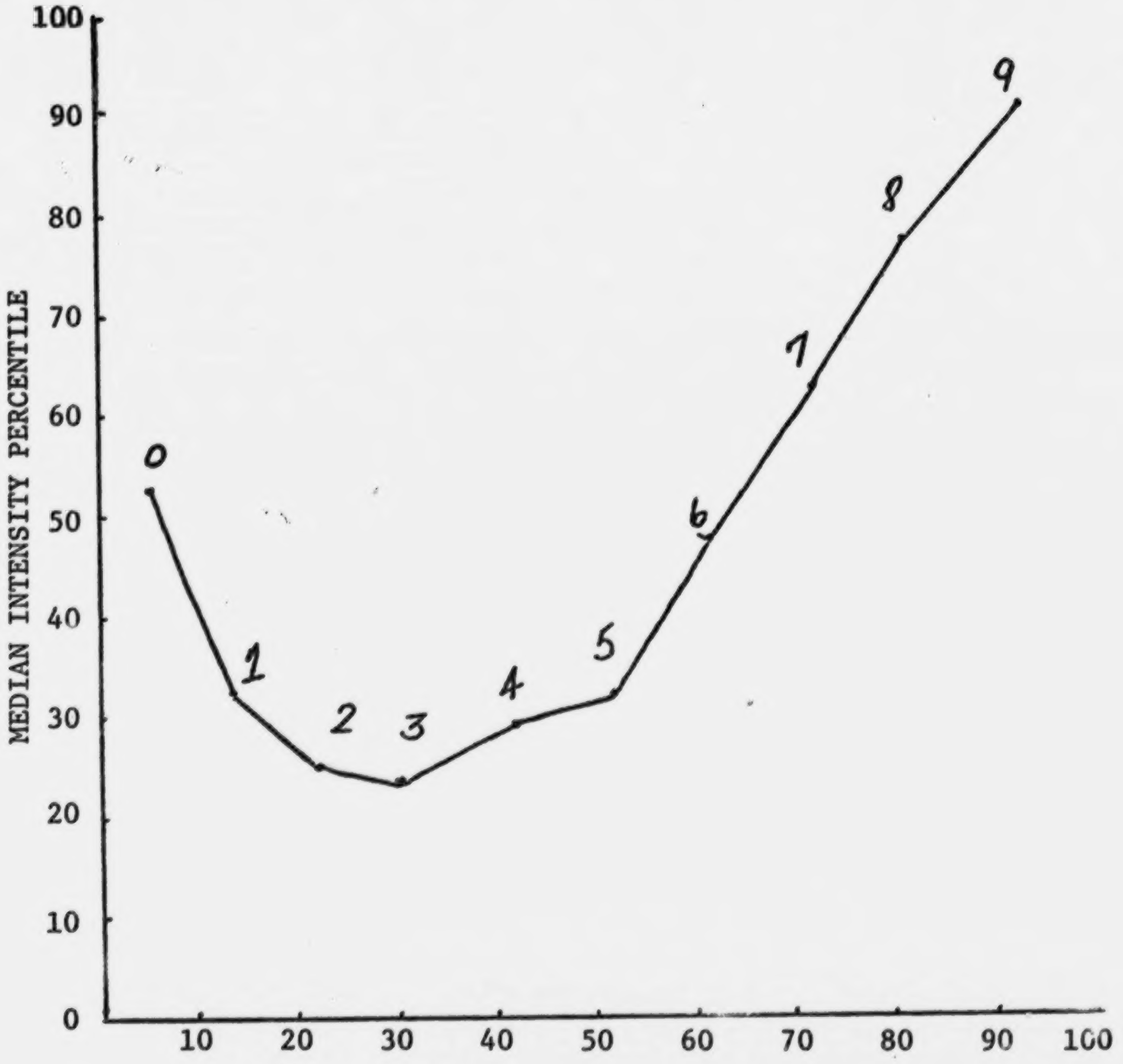


FIGURE 2
INTENSITY CURVE FOR LAST
VISITATION



MIDPOINT OF CONTENT PERCENTILE

The foldover technique was used to determine intensity scoring. The answers to each item were dichotomized. Students answering an item with "a" or "d" were scored as "1" and "0" for an item answered with "b" or "c". The rationale for this technique is that a student answering an item with "a" or "d" feels more intensely favorable or unfavorable toward an item than one who answers with "b" or "c". This technique meant that intensity scores ranged from zero to nine.

The content scores (based on the number of favorable replies) were then recorded in a matrix. The cumulative percentiles were computed for content scores and then the midpoints of content percentiles were computed. Next the cumulative percentiles for intensity scores were computed and then the median intensity for each content score was computed. The median intensity for each content score was then plotted against the corresponding midpoint for content percentile (36).

Appendix H, Table 24 contains the intensity table for a combination of the first and second visitation cycles, and Table 25 contains the intensity scores for the sixth visitation cycle.

INTERACTION ANALYSIS

The large I/D (ratio of indirect to direct teacher talk) and revised or small i/d (motivation versus control) spring ratios were investigated by analysis of covariance to determine the change in interaction as a result of the feedback process. The average fall means were used as covariates. Appendix H, Tables 27 and 28 contain the ratios used in this investigation.

No significant differences materialized for either the I/D or the revised i/d. Appendix H, Tables 29 and 30 report the results of the analysis.

The I/D and revised i/d were tested for homogeneity of variance. The hypothesis of homogeneity was rejected at the .01 level for both measures. A Kruskal-Wallis test was employed to analyze gain scores on the I/D and revised i/d measures. Again, no statistically significant differences were detected.

Analysis of variance, two-way classification, by subject and treatment failed to produce any statistically significant results when applied to measures taken from the matrices. These measures were: extended direct, extended student talk, revised i/d for rows 8 and 9, and the 3-3 cell.

MINNESOTA TEACHERS ATTITUDE INVENTORY (MTAI)

The pre- and post-test scores of the MTAI (Appendix H, Tables 31 and 32) were examined by analysis of variance, two-way classification by treatments, sub-treatments and subjects.

The analyses did not yield any significant results in either treatments or sub-treatments. Appendix H, Tables 33, 34, 35, and 36 comprise the findings of these analyses.

CORRELATION COEFFICIENTS

Coefficients of consistency for results on various administrations of the Hayes Pupil-Teacher Rating Scale range from .64 to .93 (Appendix H, Table 26). Additional correlations are contained in Appendix H, Table 37.

Student achievement (ITED) and teacher attitude toward pupils (MTAI) correlated -.14 at the beginning of the school year and -.35 at the end of the school year. Student attitude toward school subjects (Remmers Scale) and student achievement (ITED) correlated .41 at the beginning of the school year and .18 at the end of the school year.

Teacher attitude toward pupils (MTAI) and student attitude as measured by the Hayes Pupil-Teacher Scale correlated .28. Insignificant correlations were obtained between the student ratings of teachers and I/D ratios and also between student attitude toward school subjects (Remmers) and teacher attitude toward pupils (MTAI).

TEACHER REACTIONS

Teacher reactions to this study were investigated and are described in Appendix I by Floyd N. Keim, a co-investigator.

DISCUSSION

The purpose of furnishing feedback by mail to teachers was to standardize this feedback and to present it in a clinically pure fashion uncontaminated by the human element as might be expected in face-to-face or person-to-person feedback. A search of the literature and discussion with authorities in the field of interaction analysis indicated that this idea has not been tried previously.

Since intact classes were randomly assigned to treatments, the 80 class means for each criterion variable were used as the basic observations for statistical analysis and the degrees of freedom for total were only 79. The chances of obtaining statistically significant differences were accordingly much smaller than if the total number of pupils had been used to compute degrees of freedom and if each pupil's score had been used as a basic observation in the statistical analysis.

Attitude toward teachers was measured by the Hayes Pupil-Teacher Reaction Scale and no significant differences among treatment means resulted. The consistency in which students rated their teachers supported previous research that students are reliable raters. The correlation between student rating of teachers and principals' ratings of teachers indicated reasonable validity for the student ratings. Cornell scalogram analysis produced an average coefficient of reproducibility of .87 for the items on the Hayes Scale. Intensity analysis in the fall indicated that an attitude score of one was the dividing point between favorable and unfavorable attitudes toward the teaching of teachers. Intensity analysis in the spring indicated that an attitude score of three was the point dividing favorable from unfavorable attitudes as measured by the Hayes Scale. The average percent pro (favorable) was .50 on this instrument. The items on the Hayes Scale could be consistently rank ordered along a continuum with the item marginals or favorable response proportions ranging from .24 to .76. The Hayes Scale does appear to be unidimensional at the high school level.

Intelligence, as measured by SRA Tests of Educational Ability was almost evenly distributed among treatments. The IQ treatment means were so similar that IQ was not used as a covariate in analyzing achievement results. Achievement as measured by the Iowa Tests of Educational Development also did not differ significantly among treatments; neither did the classroom interaction analysis patterns.

Likewise, student attitude toward school subjects as measured by the Remmers' Scale did not indicate significant differences among treatment means. Teacher attitude means as measured by the Minnesota Teacher Attitude Inventory were lower in May than at the beginning of the school year but once again the differences among treatments were not significant.

CONCLUSIONS

In this particular study where feedback to teachers was by mail only, student achievement and student attitude toward school subjects was not improved significantly by systematically increasing feedback to teachers of either (1) pupil reaction to the teaching of their teachers or (2) results of classroom interaction analysis using the Flanders' procedures. Also student achievement and student attitude toward school subjects were not found to be significantly correlated with attitudes of teachers toward their pupils (as measured in this study).

The teacher questionnaire and interview results indicated that most of the teachers felt that they had gained many valuable ideas to improve their teaching but that personal, face-to-face feedback would have helped them to a greater degree than did the written feedback via mail. The Hayes Pupil-Teacher Reaction Scale does appear to be unidimensional at the high school level since the average coefficient of reproducibility for all items was .87 and the items could be consistently rank ordered along a continuum with the item marginals ranging from .24 to .76.

IMPLICATIONS

It is indicated that this study did not provide sufficient in-service training for the teachers. In addition, face-to-face feedback by trained observers appears necessary to change teacher behavior and to improve teacher effectiveness. The problem which should be solved is how much and what kind of face-to-face feedback is needed to change teachers to the extent that teaching effectiveness is improved significantly.

Also the Hayes Pupil-Teacher Reaction Scale should be used in other experiments to further check on its unidimensionality and to determine the conditions under which it can be used to improve teaching, learning, and the quality of education.

Another recommendation to future investigators would be to arrange for feedback to teachers on the same day as observations and ratings occur.

SUMMARY

The general objectives of this study were to determine if student achievement and student attitude toward school subjects:

1. Can be improved significantly by systematically increasing feedback to teachers concerning pupil reaction.

2. Can be improved significantly by systematically increasing feedback to teachers concerning reaction of trained observers to their teaching.

3. Are significantly correlated with attitude of teachers toward their pupils.

In treatment 1 students rated their teachers four times in the fall semester. After these ratings each teacher was mailed a completed print-out of the average class ratings each time for each item and for total. Three months later the students again rated their teachers. If student rating of teachers could be used to improve teaching and learning, this would be a comparatively inexpensive way to effect the quality of education.

Treatment 2 involved systematic recording of classroom teacher-pupil interaction (by two carefully trained observers) four times in the fall and twice in the spring. Treatment 3 was similar to treatment 2 except the teachers were observed only twice in the fall and once in the spring. In both treatments 2 and 3 the interaction analysis results were mailed promptly and directly to the teachers.

In treatment 4 the teachers were sent only the pre-test results for achievement and attitude toward school subjects. In treatment 5 the teachers received no feedback. In the first three treatments one-half of the teachers were also given pre-tests results but this did not apparently affect either achievement or attitude.

Teachers in the first four treatments were asked to reply to a questionnaire and then they were interviewed to obtain additional evidence concerning both the effectiveness of the study and how to improve future studies of a similar nature. Major suggestions of most teachers were more in-service training and face-to-face feedback rather than just written feedback by mail.

No statistically significant differences were found between achievement or attitudinal means. The Hayes Pupil-Teacher Reaction Scale analysis did indicate that it may be a unidimensional scale at the high school level.

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APPENDIX A

INTERACTION ANALYSIS: A PROGRAM FOR INTERPRETATION OF MATRICES

Directions: See "Categories for Interaction Analysis" on last page and then return to Phase I below.

PHASE I - INTRODUCTION TO MATRIX

The observer becomes familiar with the classroom atmosphere before beginning to record interaction. Once the observer begins recording numbers, he categorizes the classroom interaction every three seconds or overy time a change in categories occurs. After the observer ceases recording, he has a list of category numbers which is the raw interaction data. In order to interpret this data, he can produce a systematic summarization by entering the category numbers into a matrix. The matrix preserves the sequence pattern of events, but does not preserve the temporal order of events.

1-1 The matrix could best be described as preserving:

(a) Temporal order of events
(b) Quantified sequence of events
(c) Non-verbal behavior

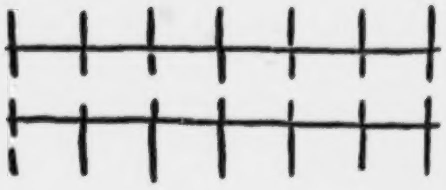
(b)

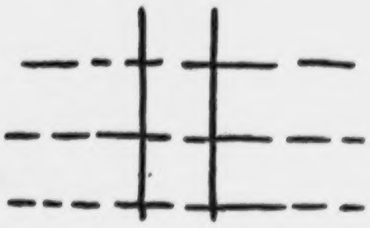
This is a Matrix

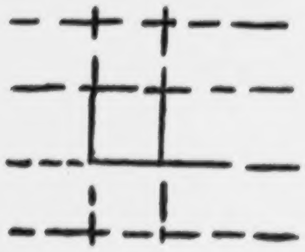
	1	2	3	4	5	6	7	8	9	10	Total
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
Total											

APPENDIX A (CONTINUED)

The matrix consists of 10 rows and 10 columns. The rows run horizontally and the columns run vertically, Each unit in the matrix is called a cell.


row


column


cell

1-2 A matrix consists of 10__________and 10______________

1-3 Each unit in the matrix is called a____________________

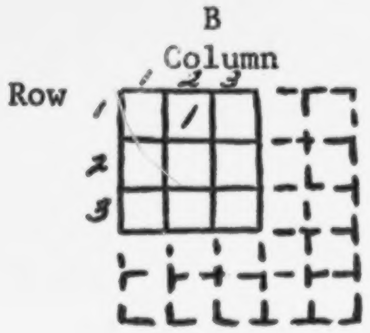
1-4 The rows run______________and the columns run__________

Rows and columns
Cell

Horizontally and vertically

Filling in a matrix is called tabulating or tallying. After he has recorded his raw date (see A) in the classroom, the observer begins to tabulate the raw data into the matrix. To tabulate into a matrix, the observer must use the first number he has recorded as the row number, and the second number as the column number. For example, if the first number is "1" and the second number is "2", enter a tally mark into the matrix in row one, column two (see B). It is important to note that this pair of numbers is recorded as one tally.

A
Row 1
Column (2
3
4
8
8
2
3



1-5 Filling in a matrix may be described as______________

1-6 In a consecutive pair of numbers, the first is called the______________number.

1-7 The second number is called the______________number.

Tabulating or tallying

Row

Column

APPENDIX A (CONTINUED)

1-8 Each tally in the matrix represents__________recorded numbers. 2

1-9 If a consecutive pair of numbers are 2,4 then the row number is________and the column number is__________ 2,4

1-10 The cell in which the above pair of numbers is placed is called the______________cell. 2,4

In the example of a segment of classroom interaction (see C) we notice that each number is used twice.

	C	
	1	Row
Row	2)	Column
Column	(3	Row
Row	4)	Column
Column	(8	Row
Row	8)	Column
Column	(2	

1-11 The column number of the first pair becomes the______ number of the second pair. Row

1-12 Using the same procedure, we can see that the third pair of numbers has as its row number the number______ and as its column number the number__________ 3,4

1-13 The fourth pair of numbers has as its row number the number_________and as its column number the number___ 4,8

1-14 The tabulation or tally for the fourth pair of numbers would therefore be places in the___________cell. 4,8

PHASE II - APPLICATION OF RAW DATA TO MATRIX (refer to figure 1)

We shall now construct a matrix from a summarization of data obtained from a 15 minute class period.

Example: Teacher: "John, What day of the week is it?"
John: "Today is Friday."

This dialogue would be categorized as a 4-8 and one tally or tabulation would be placed in the 4-8 cell.

2-1 The 4-8 cell is located at the intersection of_______ 4 and___________8. Row Column

APPENDIX A (CONTINUED)

2-2 If there were 16 such interactions during the class period, we would place the number_____in the 4-8 cell.	16

Directions: Insert the given number of tallies in their proper cells to complete the practice matrix. (figure 1)

2-3 The teacher has interrupted his lectures with questions 9 times. The 9 would be place in row_____column _____. Place 9 tallies in the 5,4 cell.	5,4
2-4 The teacher has continued to lecture after asking a question 4 times. These tallies belong in row_____ column_____. Place 4 tallies in the proper cell.	4,5
2-5 The teacher has asked extended or long questions 11 times. These tallies go in row_____column_____ Enter the tallied in the proper cell.	4,4
2-6 The students have responded to direct questions with a narrow, factual answer 44 times. You can summarize this particular interaction by placing the number_____ in row 4 column 8. Enter the tallies in the proper cell.	44
2-7 There were no responses to teacher questions in which the students presented their own ideas. Therefore there are_____tallies in cell 4-9.	No
2-8 A factual student response was followed 29 times by teacher priase or encouragement. The number 29 goes into the_____cell. Enter the tallies in the proper cell.	8,2
2-9 A factual student response is followed by a teacher question 13 times. The number 13 would be place in row_____column_____. Enter the tallies in the proper cell.	8,4
2-10 A factual student response is followed by teacher directions 12 times. The number 12 is placed in the_____ cell. Enter the tallies in the proper cell.	8,6

APPENDIX A (CONTINUED)

INCOMPLETE PRACTICE MATRIX

Figure 1

	1	2	3	4	5	6	7	8	9	10	Total
1											
2		2	2		12	5	1				
3		1		3	1	2					
4		2				6	1				
5		2			18	14					
6		2		7	6	16		23		6	
7					1						
8								28			
9											
10				4		5				14	
Total											

PHASE III - INTERPRETING CLASSROOM INTERACTION FROM THE "FRINGE" MATRIX DATA

We now have an idea of how raw data is entered into the matrix. We can now quantitatively analyze the data that we have in the matrix by working with the "fringe" or border areas of the matrix. (refer to figure 2)

The first data that can be taken from the fringe area is the percentage of the total interaction in each column. This is found by dividing the number of tallies in each column by the total number of tallies which in this case is 343. (see figure 2)

3-1 The greatest proportion of interaction is found in column__________.	8
3-2 The percentage of interaction in column 8 is__________.	28%
3-3 The smallest proportion of interaction is found in column__________and__________.	1,9

APPENDIX A (CONTINUED)

3-4 The percentage of interaction in column 1 is______. In column 9 the percentage is also____________.	0,0

Referring to figure 2, we notice that we have calculated percentages for each column. From the column percentages we can find the percentage of "teacher talk", by adding columns 1-7.

3-5 The percentage of teacher talk is______. This means that the teacher talked 66% of the time in that class.	66%
3-6 We can find percentage of student talk by adding columns___________.	8,9
3-7 The percentage of student talk is__________.	28%
3-8 The percentage of total talk in the classroom can be found by adding__________.	rows 1-9 or teacher talk plus student talk

In order to determine the nature of the teacher's influence on the students, we calculate the ratio of the indirect teacher influence (sharing, praising, accepting, questioning) to the direct teacher influence (lecturing, commanding, criticizing). This is called an I/D Ratio. The indirect teacher influence columns are 1 through 4 and the direct teacher influence columns are 5 through 7.

$$I/D = \frac{1+2+3+4}{5+6+7}$$

To calculate the total number of indirect tallies we add columns 1 through 4.

3-9 The total number of indirect tallies in the sample matrix is___________.	113
3-10 The total number of direct teacher influence tallies in the sample matrix is______________.	112
3-11 If we divide the indirect tallies by the direct tallies we get an________ratio of______. For example, if a teacher has 213 tallies in rows 1-4 and 5-7, this would give an I/D ratio of $\frac{213}{213}$ which equals 1.	I/D, 1.008

APPENDIX A (CONTINUED)

An I/D ratio of 1.00 means that for every indirect teacher influence statement, there was one direct teacher influence statement.	
3-12 A teacher had 200 indirect statements and 100 direct statements, His I/D ratio is______________.	2
3-13 An I/D ratio of 2.00 would mean that for every two indirect teacher influence statements, there was_____ direct teacher influence statement.	one
3-14 An I/D ratio less than 1.00 would mean that the teacher is more________than indirect in his influence on the students.	Direct
3-15 Therefore a more indirect teacher would have a________ I/D ratio than a more direct teacher. (a) higher, (b) lower	(a) higher
A revised I/D ratio, sometimes written as small i/d ratio, can be used to determine teacher emphasis on motivation and control. In this ratio, the number of tallies in columns 1, 2, 3, is divided by the number of tallies in columns 6 and 7. $i/d = \frac{1+2+3}{6+7}$	
3-16 The revised i/d differs from the I/D ratio in that we omit columns____________and___________.	4 and 5
3-17 The revised i/d ratio is less concerned with actual presentation of subject matter and more concerned with ________________and______________.	Motivation, Control
3-18 The revised i/d ratio for our practice matrix is______.	$\frac{45}{66} = \frac{1-3}{6-7} = .68$
3-19 The above revised i/d ratio indicates that the teacher used more_________teacher influence than________teacher influence in motivating and controlling the students because the i/d ratio is less than 1.	Direct, indirect
3-20 If the same teacher would have had a revised i/d larger than one, then we would say that in matters of motivation and control, the teacher's influence was usually_____.	indirect

APPENDIX A (CONTINUED)

Our final I/D is called the I/D ratio for rows 8 and 9 or I/D 8,9. This ratio is found by adding the tallies in rows 8 and 9, columns 1 through 4 and dividing this number by the tallies in rows 8 and 9, columns 5 through 7. The type of teacher reaction, direct or indirect, to student talk is recorded by this ratio.

3-21 In columns 1-4 the tallies in rows 8-9 represent_____. (a) The direct portion of rows 8 and 9, (b) The indirect portion of rows 8 and 9.	(b)
3-22 In columns 5-7 the tallies in rows 8-9 represent_____. (a) The direct portion of rows 8 and 9, (b) The indirect portion of rows 8 and 9.	(a)
3-23 I/D 8,9 for the practice matrix is___________________.	$\frac{47}{20} = 2.31$
3-24 The I/D 8,9 gives us some idea of the type of teacher response to student_____________.	Talk
3-25 The high I/D 8,9 for our practice matrix would indicate that the teacher uses_________influence more than __________influence in his responses to student talk.	Indirect, direct

APPENDIX A (CONTINUED)

COMPLETE PRACTICE MATRIX "FRINGE" DATA
Figure 2

TEACHER I

		1	2	3	4	5	6	7	8	9	10	Total
INDIRECT INFLUENCE	1											0
	2		2	2	16	12	5	1				38
	3		1		3	1	2					7
	4		2		11	4	6	1	44			68
DIRECT INFLUENCE	5		2		9	18	14				3	46
	6		2		7	6	16		23		6	60
	7				5	1						6
STU- DENT TALK	8		29	5	13	4	12	4	28			95
	9											0
SILENCE	10				4		5				14	23
	T	0	38	7	68	46	60	6	95	0	23	343
	%	0	11	2	20	13	18	2	28	0	6	
		INDIRECT INFLUENCE				DIRECT INFLUENCE			STUDENT TALK		SILENCE	

Total Talk = 94%
Teacher Talk = 66%
Student Talk = 28%

I/D = 1.008
i/d = .68
I/D 8,9 = 2.31

APPENDIX A (CONTINUED)

PHASE IV - INTERPRETING INTERACTION FROM THE "CORE" OF THE MATRIX

Now that we have examined the interpretations that can be made from the "fringe" areas of the matrix, we can turn to interpretations that can be made from the buildup of tabulations in individual cells and certain areas within the matrix. For this purpose we will use figure 3 which outlines particular areas of the matrix with which we are concerned. We can then refer to the data in figure 2 to give these areas practical significance.

If you will look at figure 3, you will see a shaded area in the form of a cross in rows 4 and 5 columns 4 and 5. This area is called the content cross. Tallies in this area represent teacher lecture or teacher asking for information. Therefore, this area indicates teacher emphasis on subject matter.

4-1	The "content cross" covers rows_____and_____horizontally and columns_____and______vertically.	4,5::4,5
4-2	We also notice that there is an area A at the intersection of the cross. This area shows us the amount of extended teacher_________and____________.	Lecture, questions
4-3	Turn to figure 2. Looking at area A, we notice that the 5-5 cell contains 18 tallies. This means that there were 18 pairs of 5-5 combinations or 18 instances of extended___________.	Teacher lecture
4-4	An interaction such as this, lecture followed by lecture or praise followed by praise, is called as "steady-state." Therefore the 5-5 cell would be called a__________cell.	steady-state
4-5	Another "steady-state" cell in the "content cross" is the______cell.	4-4
4-6	Are there any other "steady-state" cells within the "content cross?" (a) Yes, (b) No	No

---

APPENDIX A (CONTINUED)

There are ten "steady-state" cells in the entire matrix. These are the 1,1;2,2; etc. through 10, 10 cells from the upper left diagonally to the lower right of the matrix. Entries in "steady-state" cells indicate that the speaker has remained in a particular category for more than 3 seconds. All other cells are "transition" cells.

4-7	The 5-4 cell is __________ cell.	Transition
4-8	The only other "transition" cell in area A is the _____ cell.	4-5
4-9	The 5-4 cell shows a transition from teacher lecture to teacher ________.	Question
4-10	The 4-10 cell shows a transition from _____ to _________.	Teacher question to silence

---

Focusing our attention to the right-hand side of the matrix in figure 3, we see area B. This is the area of student response. By looking at the tallies in the separate cells in columns 8 and 9, rows 1 through 7, we can tell what stimulated or initiated student talk.

4-11	In order to determine what initiated student talk, we should look at columns _____ and _____, rows _____ through _____.	8,9::1,7
4-12	The 44 tallies in the 4-8 cell in our practice matrix (figure 2) indicate that 44 times student talk was initiated by teacher _________.	Questions
4-13	The 44 tallies in the 4-8 cell indicate memory-type teacher __________ followed by factual, narrow student ________.	Questions, Answers
4-14	The 23 tallies in the 6-8 cell indicate teacher ________ followed by student _________.	Directions, responses
4-15	The 8-8 cell is a __________________________ cell.	"steady-state" or extended student talk
4-16	The 28 tallies in the 8-8 cell indicate amount of student responses that were longer than ______ seconds in duration.	3

Just as area B in figure 3, shows what initiated student talk, area C (rows 8 and 9, columns 1 through 7) shows the type of teacher response that followed student talk.

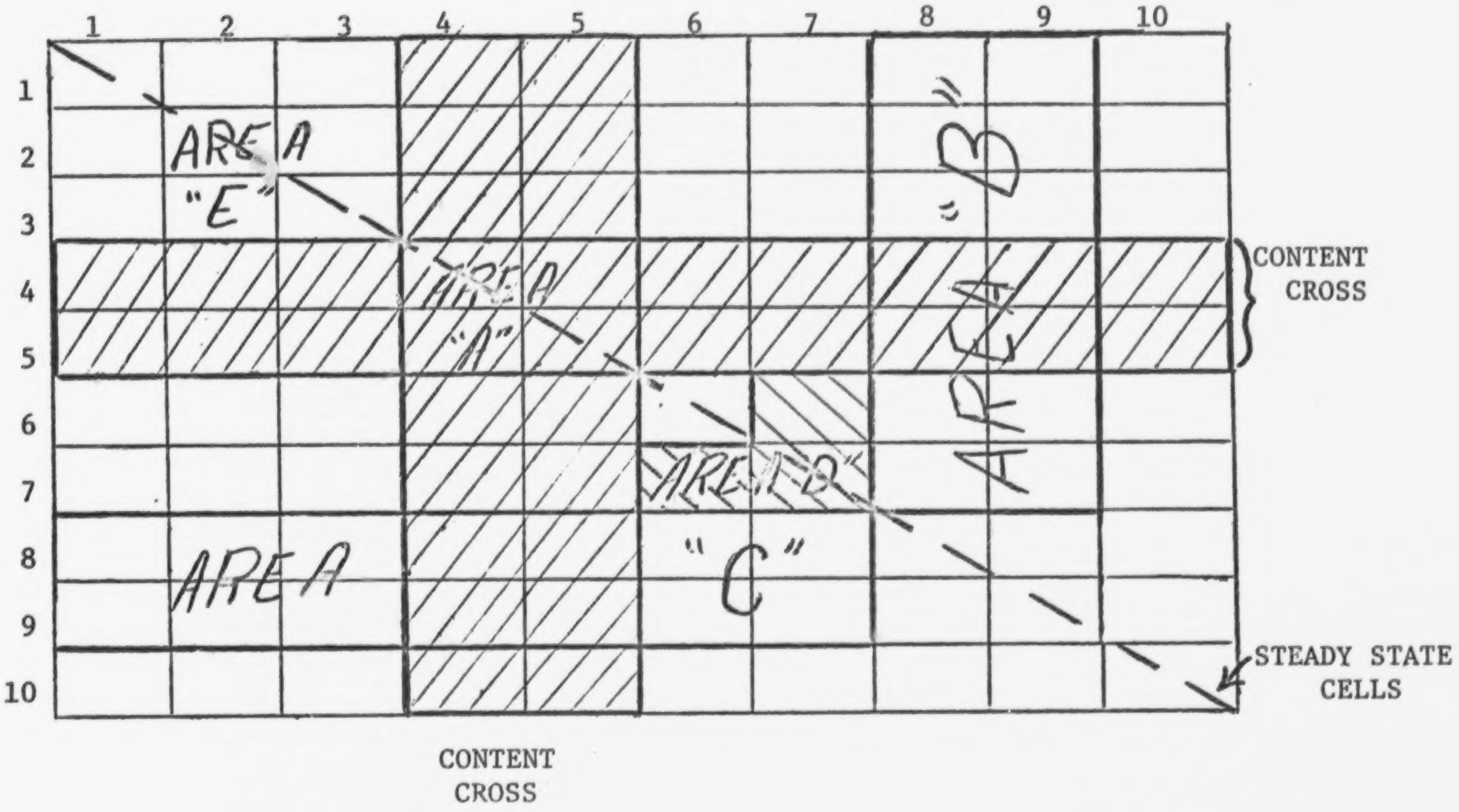
4-17	Since all of the student responses in our practice matrix (figure 2) were factual, narrow responses, all of the tallies in area C are in row________.	8
4-18	In figure 2 the teacher has usually responded to student answers with praise. We find this by looking at cell____________.	8-2
4-19	Cell 8,2 has___________tallies.	29
4-20	Cell 8,3 has___________tallies.	5
4-21	If we compare cells 8-2 and 8-3 in figure 2, we would say that the norm for this teacher is______. (a) The teacher uses student ideas, elaborating and expanding on them and integrating them into the lesson. (b) The teacher praises the students for giving the predetermined answer and then continues with his lesson.	b

Moving next to the area designated as D in figure 3, which is referred to as the extended direct area, we have cells showing criticism -- directions sequences. This area also shows the vicious circle sequence in which the teacher gives a direction, the students resist, the teacher criticizes and gives another direction, etc.

4-22	Tallies in the "vicious circle" reflect upon_____. (a) classroom management and control, (b) subject matter content	a
4-23	The practice matrix (figure 2) shows that_____. (a) students did resist directions and were criticized, (b) students did not resist directions	b

APPENDIX A (CONTINUED)

MATRIX CODE AREAS
Figure 3


1
2
3
4
5
6
7
8
9
10
AREA "E"
AREA "A"
AREA "B"
AREA "D"
AREA "C"
CONTENT CROSS
CONTENT CROSS
STEADY STATE CELLS

4-24	The term "vicious circle"_______. (a) would apply to the practice matrix (figure 2), (b) would not apply to the practice matrix (figure 2)	b
4-25	Area E in figure 3, shows us the amount of extended ________teacher influence. (a) indirect, (b) direct	indirect
4-26	The tallies in the 2-3 cell indicate a transition in teacher behavior from______to__________of student ideas.	Praise, acceptance
4-27	Judging from the number of tallies in the 3-3 cell in figure 2, we can assume that teacher acceptance and use of student ideas occurred______. (a)frequently, (b) infrequently, (c) never	c

APPENDIX A (CONTINUED)

Figure 4

TEACHER II

		1	2	3	4	5	6	7	8	9	10	Total
INDIRECT INFLUENCE	1		1			1						2
	2	1	4	5	6	2	1			4		23
	3		1	9	3	4	2			3		22
	4				4	1	1		22	4	3	35
DIRECT INFLUENCE	5		1	1	9	27	4			8		50
	6		1		2	2	3		2	2	1	13
	7					1	2	1				4
STU-DENT TALK	8		8	5	7	6			26			52
	9	1	7	2	1	6		3		9	2	31
SILENCE	10				3				2	1	2	8
	T	2	23	22	35	50	13	4	52	31	8	240
	%	1	9	9	14	21	6	2	22	13	3	
		INDIRECT INFLUENCE				DIRECT INFLUENCE			STUDENT TALK		SILENCE	

Total Talk = 97%
Teacher Talk = 62%
Student Talk = 35%

I/D = 1.20
i/d = 2.8
I/D 8,9 = 2.06

APPENDIX A (CONTINUED)

PHASE V - PROBLEMS INVOLVING THE COMPARISON OF TWO MATRICES: FINAL EXAM

5-1 Which cell is used to determine extended teacher lecture?
(a) 4-4, (b) 5-5, (c) 6-6

In working the following problems, you will compare our practice matrix (figure 2, teacher 1) with the sample matrix (figure 4, teacher 2).

5-2 Which teacher, comparing teacher #1 with teacher #2, has more extended lecture?
(a) teacher 1, (b) teacher 2

5-3 Which teacher is the more indirect?
(a) teacher 1, (b) teacher 2

5-4 Does an indirect teacher necessarily spend less time on extended lecture?
(a) yes, (b) no

5-5 Which teacher asked more narrow, factual questions which were followed by factual student replies?
(a) teacher 1, (b) teacher 2

5-6 Which teacher used more extended commands or directions?
(a) teacher 1, (b) teacher 2

5-7 Which teacher has more lecture followed by student talk?
(a) teacher 1, (b) teacher 2

5-8 Which teacher is more inclined to encourage or praise a student response?
(a) teacher 1, (b) teacher 2

5-9 In which ratio do these two teachers differ more?
(a) I/D, (b) revised i/d

5-10 This indicates a greater difference between the two in method of:
(a) content presentation, (b) motivation and control

APPENDIX A (CONTINUED)

5-11 Immediately following student talk which of the two teachers responds more indirectly?
(a) teacher 1, (b) teacher 2

5-12 The answer to question 5-11 is determined by the:
(a) I/D ratio, (b) $I/D_{8,9}$ ratio, (c) revised i/d ratio

5-13 From the $I/D_{8,9}$ ratio we can say that:
(a) both teachers respond more indirectly than directly to student talk.
(b) only teacher 1 responds more indirectly than directly to student talk.
(c) only teacher 2 responds more indirectly than directly to student talk.
(d) both teachers respond directly to student talk.

5-14 The big difference between the two teachers in area C (teacher response to student comments) can be seen by comparing:
(a) the total number of tallies in the area for both teachers
(b) row 9 of both teachers, (c) the 8-8 cell of both teachers

5-15 Looking at area D, we can see some evidence of the "vicious circle" in:
(a) teacher 1, (b) teacher 2, (c) neither

5-16 In area E (extended indirect influence) we can see that teacher 2 has many more tallies than teacher 1, but the significant difference in this area can be seen in the:
(a) 2-2 cell, (b) 2-1 cell, (c) 3-3 cell

5-17 Judging from the two matrices and from what you have learned, which teacher appears to be the more flexible in his teaching behavior?
(a) teacher 1, (b) teacher 2

5-18 In comparing the two matrices, it would seem that the students in which class had a greater freedom of speech and were not afraid to present their ideas to the class?
(a) teacher 1's class, (b) teacher 2's class

5-19 Which teacher asked a question that was followed by silence?
(a) teacher 1, (b) teacher 2

5-20 Which teacher uses questions more often during his lectures?
(a) teacher 1, (b) teacher 2, (c) both use questions equally during lecture

APPENDIX A (CONTINUED)

ANSWER SHEET

5-1	b	5-11	a
5-2	b	5-12	b
5-3	b	5-13	a
5-4	b	5-14	b
5-5	a	5-15	b
5-6	a	5-16	c
5-7	b	5-17	b
5-8	a	5-18	b
5-9	b	5-19	b
5-10	b	5-20	c

APPENDIX A (CONTINUED)

SUMMARY OF CATEGORIES FOR INTERACTION ANALYSIS

TEACHER TALK	INDIRECT INFLUENCE	1. *ACCEPTS FEELING: accepts and clarifies the feeling tone of the students in a nonthreatening manner. Feelings may be positive or negative. Predicting and recalling feelings are included.
		2. *PRAISES OR ENCOURAGES: praises or encourages student action or behavior. Jokes that release tension, not at the expense of another individual, nodding head or saying "uhhuh?" or "go on" are included.
		3. *ACCEPTS OR USES IDEAS OF STUDENT: clarifying, building or developing ideas or suggestions by a student. As teacher brings more of his own ideas into play, shift to category five.
		4. *ASKS QUESTIONS: asking a question about content or procedure with the intent that a student answer.
	DIRECT INFLUENCE	5. *LECTURES: giving facts or opinions about content or procedure; expressing his own idea; asking rhetorical questions.
		6. *GIVES DIRECTIONS: directions, commands or orders with which a student is expected to comply.
		7. *CRITICIZES OR JUSTIFIES AUTHORITY: statements intended to change student behavior from nonacceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he is doing, extreme self-reference.
STUDENT TALK		8. *STUDENT TALK-RESPONSE: talk by students in response to teacher. Teacher initiates the contact or solicits student statement.
		9. *STUDENT TALK-INITIATION: talk by students, which they initiate. If "calling on" student is only to indicate who may talk next, observer must decide whether student wanted to talk. If he did, use this category.
		10. *SILENCE OR CONFUSION: pauses, short periods of silence and periods of confusion in which communication cannot be understood by the observer.

APPENDIX B

HAYES PUPIL-TEACHER REACTION SCALE

DIRECTIONS

Please read these instructions first. Your sincere, thoughtful help will be appreciated.

Do not place any marks on this paper. On the IBM card print your name (last name first), your teacher's name, school name and today's date. Then indicate your reaction to each item on the IBM card with the electrographic pencil which has been provided. In using the electrographic pencil, please darken heavily the entire space for each answer which you select.

YOUR TEACHER AND SCHOOL ADMINISTRATORS WILL NOT SEE YOUR ANSWERS. The reaction of your entire class (as a group) will be given directly to your teacher by the Harrisburg Research Team.

DO NOT TURN THE PAGE UNTIL TOLD TO DO SO.

APPENDIX B (CONTINUED)

HAYES PUPIL-TEACHER REACTION SCALE

1. This teacher makes the lesson objectives clear in the first few minutes of the class.

   a. Always.
   b. Usually.
   c. Sometimes.
   d. Seldom or never.

2. She (he) really causes you to think:

   a. Most of the time.
   b. Often.
   c. Sometimes.
   d. Seldom or never.

3. Her (his) explanations are:

   a. Extremely clear and to the point.
   b. Very clear and to the point.
   c. Adequate, might be better.
   d. Often not clear or not to the point.

4. Her (his) lesson materials are:

   a. Outstanding.
   b. Very good.
   c. About average.
   d. Definitely below average.

5. Her (his) lessons provide very well for the needs, interests, and experience level of students:

   a. Always.
   b. Usually.
   c. About half the time.
   d. Sometimes or seldom.

APPENDIX B (CONTINUED)

HAYES PUPIL-TEACHER REACTION SCALE

6. Her (his) instruction is very realistic:

   a. Always.
   b. Often.
   c. Sometimes.
   d. Seldom or never.

7. Her (his) instruction is:

   a. Extremely challenging.
   b. Very challenging.
   c. Somewhat Challenging.
   d. Not very challenging or usually unchallenging.

8. She (he) concludes lessons by:

   a. Capably emphasizing the main points.
   b. Repeating the main points.
   c. Abruptly stopping, but this does not bother me.
   d. Abruptly stopping and I often wonder what I should have learned during the period.

9. This teacher uses excellent examples to make ideas clear:

   a. Most of the time.
   b. Usually.
   c. About half the time.
   d. Sometimes or seldom.

10. This instructor is the very best I've ever had.

    a. Agree
    b. Disagree

11. This instructor is one of the best.

    a. Agree
    b. Disagree

12. Her (his) teaching is effective.

    a. Agree
    b. Disagree

HAYES PUPIL-TEACHER REACTION SCALE

13. Her (his) lessons are at least average or better.

    a. Agree
    b. Disagree

14. Her (his) teaching is not quite adequate.

    a. Agree
    b. Disagree

15. Her (his) lessons are poor.

    a. Agree
    b. Disagree

16. This teacher is very ineffective.

    a. Agree
    b. Disagree

17. This teacher is the worst I've ever had.

    a. Agree
    b. Disagree

18. This subject is one of the best.

    a. Agree
    b. Disagree

19. This subject is "okay".

    a. Agree
    b. Disagree

20. This subject is dull.

    a. Agree
    b. Disagree

APPENDIX C

Commonwealth of Pennsylvania
Department of Public Instruction
Harrisburg, Pennsylvania

Teacher________________________

School________________________

Date of Pupil Completion of Hayes Reaction Scale________________

Rationale for Pupil Teacher Rating

Kinhart[1] found that pupils of teachers who received ten hours of supervision did significantly better school work than pupils whose teachers were without supervision. Ten hours per month per teacher is costly. A need exists to determine if significant improvement in student growth can be achieved with the minimum hours of teacher supervision.

Costs of improving the quality of education could be reduced even further if significant improvement in student growth could be effected through pupil teacher rating and feedback of results to teachers. Gage, Chatterjee and Runkel[2] found that sixth grade teachers will modify their teaching in the light of pupil rating if feedback of these ratings is given to the teachers. If feedback of pupil reaction to the teaching of their teachers has as beneficial a result as feedback of observer ratings, then a considerable savings could be made in both time and money.

Teachers need to see themselves as their students see them. The crucial test of teaching is how it changes the students who are being taught. Students are the only group who see their teachers day in and day out in the classroom. Students are not experts on the teaching process but they can furnish valuable evidence which should be used to improve teaching. Objective teachers want to know how they can get along more successfully with their students.

There is evidence that students are honest, reliable raters of teachers and that students can furnish valuable evidence even though they are not experts on teaching. Bryan[3] cites studies of student ratings with reliability coefficients ranging from .64 to .99 with an increase in reliability as the studies move from the college level to the intermediate elementary level.

Teacher________________________

Evidence of validity of pupil ratings is that such ratings have correlated as follows with principals' ratings for the same teachers:

.60 with discipline ratings
.70 with teacher-pupil relations
.40 with ability to encourage learning.[4]

Starrak discovered that the opinions of students and of three faculty experts agreed seventy-five percent of the time.[5] Druckers and Remmers found that alumni gave similar ratings to their former teachers when these alumni had been students.[6]

At Brooklyn College no appreciable relation was found to exist between ratings given to teachers by students and each of the following: course grades received by students (6,681), size of classes, sex of students, college year, or whether or not the course was elective.[7] Remmers[8] and Hudelson[9] report low correlation coefficients (.07 and .19 respectively) between student ratings of college instructors and student grades received from their instructors. It appears that students, if approached properly, are honest, reliable raters of their teachers.

Remmers also says: "If 25 or more student ratings are averaged, they are as reliable as the better educational and mental tests at present available."[10] In this experiment you are given your average ratings by item and for total since a few students can be expected to be much too far to one extreme or another.

Gage, Runkel, and Chatterjee found that when sixth grade teachers were furnished information on how their pupils described their actual teacher and how they described their ideal teacher, teachers' behaviors changed in the direction of their pupils' conception of an ideal teacher by the second time the pupils rated their actual teacher a month or two later. The feedback not only changed teacher behavior but the teachers were able to more accurately predict their pupils' description of their teaching.

In this study students will rate their teachers in the fall semester with feedback to certain randomly slected teachers. In March and April students will rate their teachers so the investigator may see if teachers have improved in the eyes of their students.

A great number of pupil-teacher rating instruments have been devised and are of value but it is indicated that a more satisfactory instrument is needed. Barr has examined many investigations of teaching efficiency of the past several decades and he has found them paying insufficient attention to "...The particulars of teaching..."[11] and the relationship between teacher and student.[12] Those devising teacher-

Teacher_______________________

rating instruments seem to have ignored the unidimensional scalogram technique. Yet McNemar conceded as early as 1946 that a scale devised by this technique has "...superiority on the single dimension problem..."[13]

A unidimensional scale places each item along a single continuum similar to the inches of a yardstick. Each total score tells which items were reacted to favorably and which were reacted to unfavorably. Intensity analysis can be used to determine which score represents a dividing line between favorable and unfavorable attitudes. A satisfactory unidimensional scale is derived from the universe of attributes which define the concept and have a common content.

Since there is evidence that the Hayes Pupil-Teacher Reaction Scale may be unidimensional, it will be used in this study. Several administrations and successive refinements in 1960 of the Hayes Scale indicated that there are certain desirable behaviors which are generally characteristic of good teachers and that these behaviors are not generally characteristic of poor teachers.[14]

In 1961 a follow-up study[15] with the Hayes instrument resulted in what appears to be a unidimensional instrument to measure attitude of students toward the teaching effectiveness of their teachers. Intensity analysis for all 660 ratings indicated that an attitude content score of five was the fixed zero point dividing favorable from unfavorable attitudes. The attitudinal items were consistently rank ordered along a single continuum.

In the preceding study internal validity was established by adding eight statements ranging from "This instructor is the very best I've ever had" to "This instructor is the worst I've ever had." The coefficients of correlation between scores on these eight statements and the scores for the attitude statements were:

Instructor	r	Number of Raters
A	.93	112
B	.85	147
C	.70	176
D	.81	139
E	.65	86

In view of the advantages of a unidimensional scale that concentrates on classroom teaching, it would be desirable to see if it will work in this study. A copy of this scale is enclosed. Also the reactions of your pupils to your teaching is indicated on the attached sheets. We hope that by your analysis of these results you will get

APPENDIX C (CONTINUED)

Teacher______________________________

some ideas which will be of help to you.

Items	Frequency of Answers	Class Average
1. (Lesson objectives clear)		
a.	________________	________
b.	________________	________
c.	________________	________
d.	________________	________
2. (Causes students to think)		
a.	________________	________
b.	________________	________
c.	________________	________
d.	________________	________
3. (Clarity of explanation)		
a.	________________	________
b.	________________	________
c.	________________	________
d.	________________	________
4. (Quality of lesson materials)		
a.	________________	________
b.	________________	________
c.	________________	________
d.	________________	________
5. (Provision for student needs)		
a.	________________	________
b.	________________	________
c.	________________	________
d.	________________	________
6. (Instruction is realistic)		
a.	________________	________
b.	________________	________
c.	________________	________
d.	________________	________
7. (Challenging teaching)		
a.	________________	________
b.	________________	________
c.	________________	________
d.	________________	________

APPENDIX C (CONTINUED)

Teacher____________________________

8. (How lesson is concluded)
   a. ______________ ______
   b. ______________ ______
   c. ______________ ______
   d. ______________ ______

9. (Variety of methods)
   a. ______________ ______
   b. ______________ ______
   c. ______________ ______
   d. ______________ ______

On the above items your score was __________out of a possible 9.

For statements 10 through 17 your average falls in item________.

______________percent of your class agreed that the subject was one of the best.

______________percent of your class said the subject "okay".

Please be assured that no one except yourself has been furnished this information by our research staff. We hope that this information will help you.

---

[1] Howard A. Kinhart, The Effect of Supervision on High School English, Johns Hopkins University, 1941, p. 102.

[2] N. L. Gage, Philip J. Runkel, and B. B. Chatterjee, Equilibrium Theory and Behavior Change: An Experiment in Feedback from Pupils to Teachers, (Urbana, Illinois: Bureau of Research, University of Illinois, 1960), p. 90.

[3] Roy C. Bryan, Pupil Rating of Secondary School Teachers. Contributions to Education No. 708, (New York: Teachers College, Columbia University, 1937), pp. 66-71.

[4] Percival M. Symonds, "Characteristics of the Effective Teacher Based on Pupil Evaluations." Journal of Experimental Education, 23 (June 1955), pp. 289-310.

[5] J. A. Starrak, "Student Rating of Instruction." Journal of Higher Education, 5 (February 1934), pp. 88-90.

APPENDIX C (CONTINUED)

Teacher________________________

[6] A. J. Druckers and H. A. Remmers, "Do Alumni and Students Differ in Their Attitudes Toward Instructors?" Journal of Educational Psychology, 62 (March 1951), p. 142.

[7] Abraham S. Goodhartz, "Student Attitudes and Opinions Relating to Teaching at Brooklyn College, " School and Society, 68 (November 20, 1948), pp. 345-9.

[8] H. H. Remmers, "The Relationship Between Students' Marks and Student Attitude Toward Instructors," School and Society, 28 (December 15, 1928), pp. 759-60.

[9] Earl Hudelson, "The Validity of Student Rating of Instructors," School and Society, 73 (April 28, 1951), pp. 265-66.

[10] H. H. Remmers, "Rating Methods in Research on Teaching," Handbook of Research on Teaching, p. 367.

[11] Arvil S. Barr, "The Measurement and Prediction of Teaching Efficiency-A Summary of Investigations." Journal of Experimental Education, (June 1948), p. 216.

[12] Arvil S. Barr, "The Measurement of Teacher Characteristics and Predictions of Teaching Efficiency." Review of Educational Research, 22 (June 1952), p. 172.

[13] Quinn McNemar, "Opinion-Attitude Methodology." Psychological Bulletin, 43 (July 1946), p. 311.

[14] Robert Bennett Hayes, "A Measure of Student Attitude Toward Teaching Effectiveness." (Unpublished D. Ed. dissertation, The Pennsylvania State University, 1961), pp. 107-108.

[15] Robert B. Hayes, "A Way to Measure Classroom Teaching Effectiveness." Journal of Teacher Education, 14 (June 1963), pp. 168-176.

If you have any questions or suggestions, please contact:

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RBH:j

APPENDIX D

Commonwealth of Pennsylvania
Department of Public Instruction
Box 911, Harrisburg, Pennsylvania 17126

February 14, 1966

To selected Teachers in Feedback Study

Re: Pupil-Teacher Rating - Can It Help You?

We want to share some information with you which has been obtained in our feedback study and which may help you to understand and to use the results of ratings by your pupils. First, we want to emphasize that these results are strictly confidential; no one except you is being given pupil ratings concerning you as an individual.

Next we want you to know that the results of this study confirm previous research findings that pupils are reliable raters. You will recall that the first nine items of the Hayes Pupil-Teacher Reaction Scale concern the teaching process. A correlation of .91 has been obtained between teacher ratings in October and three weeks later. This (test re-test) correlation of .91 is very close to a perfect correlation of 1.00. The length of the average interval of 21 days between ratings and also the fact that 64 teachers and 1683 pupils were involved makes this high stability coefficient all the more remarkable.

We also have some evidence of the validity of these ratings. You will recall that items 10 through 17 ranged from "This instructor is the very best I've ever had," to "This teacher is the worst I've ever had". The "very best" were given a score of seven, the "best" were given a score of six, etc., so that "The worst teachers" received a score of zero. The coefficient of correlation between such scores and scores for the first nine items on the Hayes Scale was .62.

We hope that this evidence will increase your confidence in using the results reflected in your average ratings by your students. A few students can be expected to be much too far to one extreme or the other. The average for your class should be fairly reliable and sufficiently accurate to give you some clues as to how you might improve your teaching.

APPENDIX D (CONTINUED)

Since you may wish to compare yourself with the other teachers in this study, we are including the following tables:

First Cycle - Student Rating Results for 64 Teachers
Percent by Item Alternatives

Item	a	b	c	d
1	30	45	20	5
2	49	26	22	3
3	21	49	25	5
4	11	42	46	1
5	35	51	10	4
6	56	30	13	1
7	13	35	43	9
8	28	45	18	9
9	44	47	6	3

Second Cycle - Student Rating Results for 64 Teachers
Percent by Item Alternatives

Item	a	b	c	d
1	25	47	24	4
2	44	30	23	3
3	20	51	24	5
4	12	46	40	2
5	32	54	10	4
6	50	34	14	2
7	16	39	38	7
8	24	47	21	8
9	43	48	6	3

APPENDIX D (CONTINUED)

Third Cycle - Student Rating Results for 16 Teachers
Percent by Item Alternatives

Item	a	b	c	d
1	21	49	26	4
2	37	33	28	2
3	20	49	26	5
4	10	51	37	2
5	33	51	10	6
6	46	33	17	4
7	13	41	39	7
8	20	47	24	9
9	38	50	6	6

Fourth Cycle - Student Rating Results for 16 Teachers
Percent by Item Alternatives

Item	a	b	c	d
1	19	50	27	4
2	36	35	25	4
3	19	51	26	4
4	11	48	38	3
5	28	54	14	4
6	41	37	19	3
7	15	40	37	8
8	20	45	25	10
9	37	51	7	5

We hope that the above information plus the results already furnished you will provide guidance toward self-directed improvement in your classroom behavior. Teaching will be more truly a profession if reliable instructional principles are established which can be practiced confidently in the classroom.

Sincerely yours,

Robert B. Hayes
Director
Cooperative Research
Project 3010

APPENDIX E

Commonwealth of Pennsylvania
Department of Public Instruction
Bureau of Research

Interaction Analysis

Feedback - Sheet 1

Teacher______________________________
School_______________________________
Date of Observation____________________

Your attention is invited to page 12 of the manual, "The Role of the Teacher in the Classroom". During the period you were observed, the percent of time by interaction categories was as follows:

Categories	% of Time
1. Accepting student feeling	
2. Praising	
3. Accepting or using student ideas	
4. Asking questions for students to answer	
5. Lecturing	
6. Giving directions	
7. Criticizing students or justifying teacher authority	
8. Talk by students in response to teacher	
9. Talk initiated by students	
10. Periods of silence or confusion	

There is some evidence to indicate that effective teachers have a large repertoire of behaviors. Some questions you might ask yourself are:

Do you think there are any of the above categories which you should use more?

Are there any that you might want to use to a lesser extent?

For your information, the total percent of teacher talk (categories 1-7) was_________.

The total percent of student talk was________________.

Do you feel the need to modify your teaching?

There are no hard and fast rules. It is up to you to make the decisions.

APPENDIX E (CONTINUED)

Interaction Analysis

Feedback - Sheet 2

Teacher________________________________

Are you typically a direct or indirect teacher?

If over half the teacher talk is in the direct categories, you are more direct than indirect. A crude measure of teacher influence is the "big I/D ratio" which consists of dividing all tallies - column totals - in categories 1, 2, 3, and 4 by the tallies in 5, 6, and 7. Your I/D ratio was____________________.

Certain occasions require direct behavior. Yet there is some evidence that students tend to learn more from the more indirect than from the more direct teachers.

The "small i/d ratio," or revised i/d, is computed by deleting categories 4 (teacher questions) and 5 (lectures) from the big I/D ratio. The i/d ratio is less influenced by subject content and indicates the kind of emphasis given to motivation versus control. Your small or revised i/d ratio (categories 1, 2, and 3 divided by 6 and 7) was_______________________.

Do you spend enought time accepting or praising student ideas and feelings?

The following shows the percent of time for each cell in this extended indirect influence area.

Your Extended Indirect Influence

	1	2	3
1			
2			
3			

For example, a high percent of "2,2's" would mean a lot of extended statements of praise. An explanation of praise may give insight to students which they will find useful in guiding their future behavior.

Past experience has indicated that Category 3 (Accepting Student Ideas) has a particularly important relationship to student achievement. Should you develop student ideas more thoroughly so that they feel you have really accepted their ideas?

APPENDIX E (CONTINUED)

Interaction Analysis

Feedback - Sheet 3

Teacher______________________________

Do students tend to resist your influence?

The following part of an interaction analysis matrix may be called the "vicious circle".

"Vicious Circle"

	6	7
6		
7		

This name originated because it may reflect teacher directions followed by student resistance and then teacher criticism and more directions. A high percent in this area often indicates overt student resistance. The percent of time you spent in this area is indicated in the above portion of your matrix.

What kind of student responses occur after teacher talk?

	8	9
1		
2		
3		
4		
5		
6		
7		

The above entries show the percent of time for each cell. A high percentage in column 8 compared to column 9 may indicate that your talk results in relatively predictable, memory-type student answers. More 9's tend to indicate that students feel free to initiate talk and to expand on their own ideas. By examining the sequence of what preceded an 8 or 9, one can reconstruct the stimuli which triggered student participation.

For example, the number entered in a Row 2, Column 9 cell indicates the percent of time teacher praise was followed by a student initiated statement. The 4,8 cell indicates the percent of time teacher questions were followed by predictable, memory-type student answers.

APPENDIX E (CONTINUED)

Interaction Analysis

Feedback - Sheet 4

Teacher________________________________

What happens after the students talk?

Do you praise or accept their ideas?

Do you tend to be critical?

	1	2	3	4	5	6	7
8							
9							

The percent of time in the 8,3 and 9,3 cells indicates the extent you tend to accept or use student talk.

Your I/D ratio for rows 8 and 9 is____________________.

Your small i/d ratio for rows 8 and 9 is______________.

Attached is the matrix for the entire period that you were observed. By referring to the manual, "The Role of the Teacher in the Classroom", you may extract additional information from the enclosed matrix.

APPENDIX E (CONTINUED)

Interaction Analysis

Feedback - Sheet 5

Teacher____________________________________

COLUMNS

ROWS

	1	2	3	4	5	6	7	8	9	10	Total
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
Total											

NOTE: To refresh your memory as to how this matrix was recorded, see pages 25-28 of the manual, "The Role of the Teacher in the Classroom".

APPENDIX F

Commonwealth of Pennsylvania
Department of Public Instruction
Box 911, Harrisburg, Pennsylvania 17126

October 26, 1965

To Teachers Selected to Receive Pre-Test Results

You have been selected to receive pre-test results in the feedback experiment. We hope that this information will be of help in understanding your students and their needs for the particular class which Mr. Keim and Mr. Neiman have visited.

One of the pre-tests was the Remmers Scale to measure attitude of students toward school subjects. Your attention is invited to the enclosed copy of this scale and to the manual, "The Purdue Master Attitude Scales." Your particular attention is invited to the last two pages of this manual which deal with scoring of the attitude scale and which will help you interpret the average scale score of your class which was __________.

Also enclosed is a roster showing the intelligence quotients and the percentiles for your students. These percentiles are based on your local tenth grade class. A percentile may be defined as that point below which the indicated percent of other cases (pupils) score in comparison with a particular case (pupil).

Finally, we are enclosing a sheet for each of your students in the same class showing their standard scores and percentiles (based on your local tenth-grade class) on the following subtests of the Iowa Test of Educational Development:

1. Understanding of Basic Social Studies
2. General Background in the Natural Sciences
3. Correctness and Appropriateness of Expression
4. Ability to Do Quantitative Thinking
5. Interpretation of Social Studies Reading Materials
6. Interpretation of Natural Science Reading Materials
7. Interpretation of Literature Materials
8. General Vocabulary
9. Use of Sources of Information (Reference Books, Card Catalogues, Encyclopedias, etc.)

The above numbers can be used to determine test areas indicated by the ITED sheets.

APPENDIX F (CONTINUED)

Your high school guidance counselor should be consulted for help in interpreting and using the results. He (or she) can show you the following:

1. A report of local percentile norms and a frequency distribution for the entire tenth grade class in your school
2. Manual for the School Administrator
3. Examiner's Manual
4. Manual entitled "How to Use Test Results"

We wish to thank you for your cooperation in this study.

Sincerely,

Robert B. Hayes
Supervisor of Research

RBH:j

Enclosures (4)

APPENDIX G

Commonwealth of Pennsylvania
Department of Public Instruction
Box 911, Harrisburg, Pennsylvania 17126

January 24, 1966

To Selected Teachers in Feedback Experiment

Re: Interaction Analysis - Can It Help You?

The problems of improving teacher preparation and inservice training programs extend like a massive cold front. These phenomena are quite common in Pennsylvania. You might note that the work we have done on interaction analysis so far has affected teacher preparation and inservice training to the same extent that lighting a match affects Pennsylvania weather. But we who come from the frozen north get a great deal of pleasure out of lighting a match and enjoy the warmth it sheds, however small.

As we see it, the major problem is: how can a teacher obtain objective information about his classroom behavior--information that is rich enough and clear enough to guide his steps toward self-directed improvement? This is a question of feedback. The principle of feedback is becoming more popular. It supports equally Thorndike's renaissance in the field of learning machines, provides the cutting edge of triad training in human relations, and helps our spaceman keep a rendezvous with the moon. Lack of adequate feedback has plagued teacher training for centuries, and no doubt was the major gripe of the neophytes in the high priesthood of the Pharaoh's court.

The principle of feedback is clear enough; its application in an engineering sense is quite another question. Just how can a teacher compare his performance with his own intentions under classroom conditions?

Blueprints for providing feedback in human relations training can be found in a number of references. A reference that should not be overlooked is Festinger's (1954) "Theory of Social Comparison Processes." Let me remind you of some of its most relevant hypotheses.

1. There exists, in the human organism, a drive to evaluate his opinions and abilities.

2. To the extent that objective, non-social means are not available, people evaluate their opinions and abilities by comparing them with the opinions and abilities of others.

Teachers are just as interested in comparing their opinions and abilities as any other individuals. With regard to teaching, most comparisons are made without benefit of objective methods. As a result, the comparisons are often abstract generalizations that have little relation to overt behavior, stereotypic value judgments are frequently expressed, and opinions are compared much more often than hard-to-define abilities.

3. The tendency to compare oneself with some other specific person decreases as the difference between his opinion or ability and one's own increases.

Teachers are equally prone to check each other's feathers before they flock together. The tendency to seek confirmation of current beliefs restricts innovation and the spirit of inquiry. Pressures toward uniformity that arise from such comparison processes present a formidable resistance to change.

4. When an objective, non-social basis for evaluating one's opinion or ability is readily available, persons will not evaluate their opinions or abilities by comparison with others.

We can all hope that this last hypothesis of Festinger's is correct. It suggests that a more objective system of feedback will be preferred by teachers. Yet, the premise that interaction analysis is more objective than swapping opinions does not decrease the initial resistance of teachers whose skepticism has had years of nourishment. The problem of creating incentives in inservice training remains.

It is the teacher's job to decide whether this information is consistent or inconsistent with his own intentions. He must decide what changes, if any, are desirable.

We have no research evidence to support the notion that an increase in student verbal participation per se improves learning. We do have research results to indicate that students learn more working with teachers who skillfully elicit, clarify, and challenge student ideas. Merely increasing student participation by asking questions is not enough.

Interaction analysis serves two functions in this project. First, it is being used as a pre- and post-measure of success in helping teachers modify their overt behavior, in order to make it more consistent with their own self-improvement goals. Second, it is used as a working tool to feed back information during training.

In its present form, interaction analysis is cumbersome and expensive. It is also rather a crude instrument for such a delicate task; but as one teacher put it, "You don't need a razor to cut butter."[1]

What is Interaction Analysis?

For comparative purposes, it might be a fair analogy to say that Interaction Analysis is to teaching what the movie camera is to modern sports. That is, Interaction Analysis and a movie camera are both devices which enable their users to record accurately and preserve for future study the activities of a given past event.

For example, a coaching staff and players are able to watch, stop, back up, review, and thus study films of a previous game's action. In this way they can zero in on each and any desired phase of the action. Or, a photo-finish of a horse race can accurately reveal the true winner, even in the case of a close finish where a winner cannot be determined immediately on the spot by the human eye. And now, with the advent of the "isolated camera", even the home-viewing T-V audience can witness a slow motion rerun of a crucial baseball or football play -- just instants after it occurred and as a result, be in an advantageous position to second-guess the umpire! But you might well ask what all of this has to do with Interaction Analysis and the teacher.

Now, for the first time, in Interaction Analysis teachers have available a "camera" with which they can "focus in on" and "photograph" their teaching behavior. Just as the viewing of a past sporting event allows the viewer to analyze accurately the most detailed action of a given sequence on the playing field, so will the study of the Interaction Analysis data and matrix of a classroom interaction enable the teacher to assess his classroom teaching verbal behavior. Reviewing Interaction Analysis data and the final matrix allows the teacher to identify his weaknessess and mistakes. With proper revision and practice he is in a good position to improve on his future teaching.

What are the procedures of Interaction Analysis? Before describing the mechanics of the system per se, several things should be made clear. First, Interaction Analysis is a descriptive system --

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[1] The foregoing two pages are quoted and adapted from a paper by Ned A. Flanders, "Interaction Analysis: A Technique for Quantifying Teacher Influence."

not a diagnostic one. To go back to the analogy of the movie camera; the print exposed in the camera only reproduces unbiasedly what it "sees". The camera itself cannot point out the specific weaknessess or mistakes of the players. Through careful study of the film, however, professionals are able to analyze crucial "frames" and with careful thought make relevant inferences. Then, with proper coaching and practice, the player(s) can revise his (their) behavior and, as a result become more skillful and proficient in the future. The same is true of the teacher. When the data from an Interaction Analysis observation is plotted in a matrix, the teacher has available a "picture" of his teaching behavior. With careful study, the professional teacher can analyze his classroom behavior, identify his weaknesses and mistakes, and with proper revision and practice, improve on his future teaching effectiveness.

Second, Interaction Analysis is an objective system. Previous to the use of movies in boxing, a boxer's coaching staff had to plan their training and fighting strategy after hours of first-hand observation of their man in action. Constantly they would discuss with each other what they saw (or thought they saw) him do. Needless to say, there continually arose numerous disagreements between these individuals, since their observations were based on subjective judgments and thus open to inaccuracies. But when the same coaching staff takes advantage of the movie camera, they advance their judgments from the subjective level to the objective level and as a result their judgments become more accurate. Before Interaction Analysis the evaluation of teacher effectiveness was almost always limited to the dimensions of subjectivity. Administrators and supervisors personally visited the teacher's classroom and made first-hand observations. They based their final evaluations on what they observed or thought they observed. Reports were based on such subjective criteria as the apparent "pleasantness" of the teacher, the observer's personal opinion of the teacher's skill in handling classroom situations, and the visible physical conditions of the classroom--lighting, ventilation, seating arrangement, displays, bulletin boards, and the like. Rarely if ever were their evaluations based upon any direct effect the teacher's behavior was having on the pupils, because observers had no means by which to assess this effect. With Interaction Analysis, the precise quality and sequence of the teacher's (and pupil's) verbal behavior can be recorded and used in future supervisory sessions. Not only is such data more objective, but often the resultant findings are a powerful revelation--to both observer and the teacher.

Third, Interaction Analysis is a skill, and can be learned. Before an amateur photographer can reach a high level of proficiency in taking movies, he must gain considerable understanding of and practice with a movie camera and its operation. Much the same is true in the use of Interaction Analysis. Generally the average teacher can learn the basic skills involved in taking Interaction

Analysis in six to eight hours of study. However, it should be made clear that to gain proficiency and skill in the use and interpretation of the data requires more than the initial six or eight hours--perhaps more in the neighborhood of 30 or more hours. However, the point still remains the Interaction Analysis is a skill and can be learned by any classroom teacher if he is willing to spend the time and effort necessary.

Fourth, Interaction Analysis will serve and benefit a teacher only to the extent he is willing and able to help himself. That is, he must voluntarily want to put his teaching behavior before the critical eye of the system. For some teachers, the initial idea of having his classroom behavior laid open and analyzed may present a threat. But if the system is to benefit the teacher he must be willing to accept the challenge. Next, he should have an idea of what to look for in the data and how to interpret what he sees there. In other words, a teacher must have at his disposal some previous knowledge concerning the teaching-learning act. His own mind and thinking must be clear as to what his personal role is as a "facilitator" of learning. He may secure this image by reviewing his sociology, physiology, human relations, individual behavior, subject content, and the nature of his own person. When a teacher clearly understands his role as a "facilitator" of learning, he can plan a lesson, teach it while Interaction Analysis data is obtained, and afterward analyze the data to determine if he, in fact, successfully performed in the classroom in the way he had planned. Where there are discrepancies or weakness, he can provide for correction and strengthening in the future. In this way, a teacher is able to "get the pulse" of his classroom behavior and thereby be in a position to plan for improvement.

The Procedure of Interaction Analysis

What does a person do when he takes Interaction Analysis? What is involved? As stated above, Interaction Analysis is a skill and the simple mechanics of it can be learned in a rather short period of time -- six to eight hours. The process iteself is discussed below.

The seven categories assigned to teacher talk are divided into two types of teacher influence -- indirect and direct. Categories number one through four represent indirect teacher influence and categories number five through seven represent direct teacher influence.

Indirect influence stimulates student participation, resulting in student freedom (acceptance of student feelings, praise and encouragement, acceptance and clarification of student's ideas, and solicitation of student participation through questioning). On the other hand direct influence (lecturing, giving commands, rejecting student behavior and justification of teacher role) shifts the participatory emphasis from the student to the teacher. As a result, student freedom is limited and restricted while student compliance to the teacher's demand is increased.

Division of student talk into two categories permits a proper distinction to be drawn between teacher-initiated student talk and student-initiated student talk. For example, suppose the teacher should ask the question "what city is the capitol of Nevada?" The student's answer to the question would be a result of the teacher's question which called for a single specific correct answer. This student talk would be teacher-initiated (category eight). But suppose the same student, or another member of the class, should voluntarily respond to the above episode by relating certain interesting events connected with a trip he took with his family through Nevada. This would be recorded as student-initiated talk (category nine) since the student responded on his own accord and initiative. By making a simple mathematical comparison of teacher-initiated and student-initiated student talk much can be learned about the personal nature and classroom behavior of a teacher.

For a more detailed discussion of the procedure of Interaction Analysis and how to develop the skill, refer to The Role of the Teacher in the Classroom: A Manual for Understanding and Improving Teacher's Classroom Behavior (1).

An operational knowledge of Interaction Analysis can be of significant value in at least three different ways. First, it is a valuable supervisory tool -- both at the pre-service (college) level and at the inservice level. Using Interaction Analysis, supervisors are able to assess accurately and objectively the verbal behavior of the teachers under his supervision. With proper advice and counsel the supervisor can help the individual teacher to improve his classroom behavior and ultimately make his teaching more effective.

Second, individual inservice teachers can use Interaction Analysis in analyzing their own verbal behavior. They can record a class period, later take Interaction Analysis from the tape and subsequently analyze and study the data for future improvement. Some school systems have found success in encouraging groups of two or more teachers to work together as teams in recording and analyzing each others classroom verbal interaction.

Third, an understanding of Interaction Analysis serves as an objective framework around which pre-service education courses can be built. The categorical system helps students to identify specific teaching behaviors and behavioral sequences.

The observer situates himself in the classroom in a comfortable position where he can clearly hear and view the participants. At the end of each three second interval, he decides which of the 10 categories best describes the verbal behavior just completed. He writes this number down on a tally sheet, usually arranged in vertical columns of approximately 20-25 tallies, each column representing one minute of classroom interaction. Simultaneously with the recording of the previous three-second period of interaction, the observer assesses the present three-second period. He continues this same sequential pattern over and over at as steady a tempo as possible. The completed series of category numbers represents a sequential record of the verbal interaction that occurred in the class period just observed. If he wishes, the observer may occasionally jot down brief marginal notes which are related to a particular segment of the observational data. Any major change in class formation, communication pattern, or subject under consideration is identified by drawing a double line and recording the clock time. Upon completion of the observational data (usually no less than 20 minutes) the observer takes leave to a nearby room and completes his report by giving a general description of each separate activity period indicated by the double lines including the nature of the activity, the class formation and the teacher's position. Any other notes or facts which might be necessary for an adequate interpretation of the total observational period are also included.

Flanders System of Interaction Analysis consists of ten categories -- seven assigned to teacher talk, two assigned to student talk, and a single category to designate short periods of "silence" or "confusion". A detailed outline of the category system is included on the next page.

APPENDIX G (CONTINUED)

SUMMARY OF CATEGORIES FOR INTERACTION ANALYSIS

TEACHER TALK	INDIRECT INFLUENCE	1. *ACCEPTS FEELING: accepts and clarifies the feeling tone of the students in a nonthreatening manner. Feelings may be positive or negative. Predicting and recalling feelings are included.
		2. *PRAISES OR ENCOURAGES: praises or encourages student action or behavior. Jokes that release tension, not at the expense of another individual, nodding head or saying "uhhuh?" or "go on" are included.
		3. *ACCEPTS OR USES IDEAS OF STUDENT: clarifying, building or developing ideas or suggestions by a student. As teacher brings more of his own ideas into play, shift to category five.
		4. *ASKS QUESTONS: asking a question about content or procedure with the intent that a student answer.
	DIRECT INFLUENCE	5. *LECTURES: giving facts or opinions about content or procedure; expressing his own idea; asking rhetorical questions.
		6. *GIVES DIRECTIONS: directions, commands or orders with which a student is expected to comply.
		7. *CRITICIZES OR JUSTIFIES AUTHORITY: statements intended to change student behavior from nonacceptable to acceptable pattern; bawling someone out; stating why the teacher is doing what he is doing, extreme self-reference.
STUDENT TALK		8. *STUDENT TALK-RESPONSE: talk by students in response to teacher. Teacher initiates the contact or solicits student statement.
		9. *STUDENT TALK-INITIATION: talk by students, which they initiate. If "calling on" student is only to indicate who may talk next, observer must decide whether student wanted to talk. If he did, use this category.
		10. *SILENCE OR CONFUSION: pauses, short periods of silence and periods of confusion in which communication cannot be understood by the observer.

Employing this notion in small-group role-playing situations does a lot to bring educational theory to a practical level. In addition, pre-service teachers who have an operational knowledge of Interaction Analysis can analyze different styles of teaching. Thus, they can make objective judgments as to whether or not these styles could be used effectively in their own personal teaching methods and techniques. This allows the teacher free choice as well as objective judgment in formulating his own teaching repertoire.

Interaction Analysis in In-service Education

1. In supervision. The notion that pre-service education is not an end, but rather a beginning is too often overlooked. As a result we fail miserably when we neglect in-service programs of supervision and guidance -- especially in the cases of many beginning teachers. Consequently they are allowed (more often forced) to shift for themselves and ultimately meet with failures in their teaching. Interaction Analysis provides one ray of hope in this otherwise dismal picture. As in pre-service education, discussed above, Interaction Analysis can be used as an effective means of objectively assessing the in-service teacher's classroom verbal behavior. This, along with careful thought, planning and experimentation can do much to improve teaching effectiveness.

2. As a team approach. As mentioned earlier, some administrators have recently met with success by encouraging their teachers to analyze and experiment with their teaching behavior through a team approach. Such an approach involves two or more teachers who are granted sufficient free time to observe each using Interaction Analysis. In this way they are better enabled to get at both individual as well as common instructional problems.

3. As a self-analysis approach. Perhaps the most unique feature of Interaction Analysis is the fact that an individual teacher can use it even in the absence of outside assistance. He simply records a live class session on a tape recorder. Later on, at his convenience, he plays it back, takes Interaction Analysis on his lesson, and plots the data in a matrix. Because of this feature, a single teacher has the distinct advantage of being able to analyze his own classroom verbal behavior, even when other assistance is unavailable.

Interaction Analysis as a Research Tool

1. In the analysis, classification, and study of teacher types. Traditionally educationists have been noted for their reluctance to define effectiveness in teaching. A major reason for

this hesitancy is that much in teacher evaluation is of a subjective nature. With Interaction Analysis, however, we are in a position to analyze objectively the verbal dimension of instruction. Hopefully the future will witness significant advances in the assessment and identification of various types of teacher verbal behavior.

2. In studying the effects of teacher types on learning. Suppose we perfect our ability to identify accurately different types of teacher verbal behavior. By controlling this important variable in an experimental design, we put ourselves in a position to measure the effect that a given teacher-type will have on a variety of learning factors including student perception, motivation, achievement, etc.

3. Measuring change in teacher behavior. Many things that are done in teacher education programs are done with a hope and a prayer. That is, we include in teacher preparation programs certain concepts, methods, and content because it seems "logical" that these things will result in changing the teaching behavior of the teacher. One reason we do this is that the evaluation practices employed in teacher education are of a highly subjective nature. However, if we can objectively define and assess the various progressive levels of teacher behavior, we can then establish certain definite guidelines and bench marks. Using these we can begin to measure teacher growth and subsequently the effectiveness of teacher education programs. Interaction Analysis is one of the first such objective evaluation devices to come upon the educational scene.

In Conclusion

It is the opinion of this writer that Interaction Analysis has made (will make) no less than two contributions which will affect significantly the future of the teaching profession. First, it serves as a monumental example of what must be done in the domain of objective teacher evaluation. This in itself should provide stimulation as well as a model for considerably more activity in this most vital phase of teaching.

Second, with the creation of new and better methods and techniques for measuring teacher effectiveness, the future should witness a dramatic increase in the identification of reliable instructional principles. These principles will be reliable because they will have been successfully tested by instruments which objective and therefore reliable themselves. With a multitude of tested and reliable instructional principles from which to choose we will be able to formulate instructional programs which can be put into practice in the classroom with confidence. When all of this becomes a reality, teaching will be one big step closer to being truly a profession![2]

Sincerely yours,

Robert B. Hayes
Director
Cooperative Research Project 3010

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[2] The preceding eight pages were extracted from an article by Richard L. Ober, "A Review of Flanders System of Verbal Interaction Analysis."

APPENDIX H
STATISTICAL DATA AND ANALYSIS

TABLE 1
CLASS MEANS FOR INTELLIGENCE

	TREATMENTS					
Subjects	1	2	3	4	5	Means for Total
English	101.87	112.63	108.61	121.60	103.12	
	111.16	115.04	122.03	123.83	103.00	
	114.33	129.25	112.45	113.20	95.86	
	94.96	112.27	115.07	92.78	109.25	
Means	105.58	117.30	114.54	112.85	102.81	110.62
Math	111.29	114.40	124.68	115.36	110.05	
	121.05	124.58	116.28	113.39	107.44	
	95.69	111.95	118.27	115.62	124.82	
	121.96	116.54	108.61	116.60	112.40	
Means	112.50	116.87	116.96	115.24	113.68	115.05
Science	108.61	99.92	115.04	114.59	93.76	
	111.17	121.07	104.63	120.89	118.83	
	122.39	100.68	95.91	110.52	98.57	
	116.21	103.62	116.57	93.55	100.59	
Means	114.60	106.32	108.04	109.89	102.94	108.36
Social Studies	108.61	113.12	91.79	120.75	113.86	
	116.54	129.04	109.92	115.04	94.66	
	110.52	117.75	123.76	95.93	116.35	
	109.60	105.10	113.61	124.94	95.96	
Means	111.32	116.25	109.77	114.16	105.21	111.34
Means for Treatments	111.00	114.19	112.33	113.04	106.16	111.34 (Grand Mean)

APPENDIX H (CONTINUED)

TABLE 2
ANALYSIS OF VARIANCE OF INTELLIGENCE ALL TREATMENTS (80 CLASSROOMS)

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	7006.783	-	-
Treatments	4	622.767	154.572	1.75
Subjects	3	463.717	155.692	1.77
Interaction	12	632.501	52.708	.60
Within (error)	60	5287.798	88.130	-

TABLE 3
ANALYSIS OF VARIANCE OF INTELLIGENCE SUB-TREATMENTS (48 CLASSROOMS)

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	47	3551.868	-	-
Sub-treatments	5	157.897	31.579	.38
Subjects	3	201.240	67.080	.81
Interaction	15	1212.044	80.803	.98
Within (error)	24	1980.687	82.529	-

APPENDIX H (CONTINUED)

TABLE 4
PRE-ITED CLASS ACHIEVEMENT MEANS

TREATMENTS

Subjects	1	2	3	4	5	Means for Total
English	12.80	15.60	14.96	17.78	13.45	
	16.05	16.44	19.53	21.20	13.47	
	16.10	21.68	16.23	16.46	11.68	
	10.41	17.40	17.53	11.01	15.88	
Means	13.84	17.78	17.06	16.61	13.62	15.78
Math	16.57	16.20	20.57	16.86	14.53	
	19.11	20.50	16.94	15.13	14.28	
	10.85	15.50	19.53	16.50	22.32	
	20.07	14.85	13.64	20.12	16.96	
Means	16.65	16.76	17.67	17.15	17.02	17.05
Science	16.66	13.16	17.25	18.83	11.50	
	18.35	22.23	13.50	20.79	20.54	
	21.20	12.98	15.32	17.02	10.65	
	19.86	14.12	20.64	11.97	12.95	
Means	19.02	15.62	16.68	17.15	13.91	16.48
Social Studies	16.13	16.40	11.47	18.72	17.83	
	15.77	21.87	16.25	16.71	11.90	
	17.23	17.36	18.56	12.06	19.90	
	14.07	14.19	15.25	20.46	10.75	
Means	15.80	17.46	15.38	16.99	15.10	16.15
Means for Treatments	16.33	16.90	16.70	16.98	14.91	16.36 (Grand Mean)

APPENDIX H (CONTINUED)

TABLE 5
ANALYSIS OF VARIANCE OF PRE-ITED CLASS ACHIEVEMENT MEANS ALL TREATMENTS (80 CLASSROOMS)

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	811.042	-	-
Treatments	4	46.227	11.557	1.05
Subjects	3	17.423	5.808	.53
Interaction	12	89.391	7.449	.68
Within (error)	60	658.001	10.967	-

TABLE 6
ANALYSIS OF VARIANCE OF POST-ITED ACHIEVEMENT MEANS SUB-TREATMENTS (48 CLASSROOMS)

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	47	396.878	-	-
Treatments	5	18.158	3.63	.38
Subjects	3	8.640	2.88	.30
Interaction	15	141.455	9.43	.99
Within (error)	24	228.625	9.53	-

APPENDIX H (CONTINUED)

TABLE 7
POST-ITED CLASS ACHIEVEMENT MEANS

TREATMENTS

Subjects	1	2	3	4	5	Means for Total
English	14.08	17.81	16.57	19.78	14.97	
	17.43	16.92	21.58	23.64	14.92	
	17.94	24.15	18.70	18.69	13.38	
	12.73	18.24	19.26	12.01	17.56	
Means	15.55	19.28	19.03	18.53	15.21	17.52
Math	17.93	18.35	21.43	18.23	16.16	
	21.53	24.42	18.39	15.87	17.36	
	13.15	17.95	21.47	17.38	22.41	
	22.48	16.00	17.94	22.36	18.56	
Means	18.77	19.18	19.81	18.46	18.62	18.97
Science	18.93	15.43	20.36	19.09	13.56	
	20.84	23.02	14.93	22.48	22.34	
	22.49	15.52	17.32	18.45	12.07	
	21.23	15.56	23.79	13.22	14.31	
Means	20.87	17.38	19.10	18.31	15.57	18.25
Social Studies	18.09	17.83	12.68	19.82	18.57	
	16.93	23.81	17.06	18.97	12.99	
	17.32	18.93	18.98	14.04	21.34	
	17.53	16.32	15.73	23.20	12.18	
Means	17.47	19.22	16.11	19.01	16.27	17.62
Means for Treatments	18.16	18.77	18.51	18.58	16.42	18.09 (Grand Mean)

APPENDIX H (CONTINUED)

TABLE 8
ANALYSIS OF VARIANCE OF POST-ITED CLASS ACHIEVEMENT MEANS ALL TREATMENTS (80 CLASSROOMS)

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	839.361	-	-
Treatments	4	58.801	14.700	1.36
Subjects	3	26.965	8.988	.83
Interaction	12	105.014	8.751	.81
Within (error)	60	648.581	10.810	-

TABLE 9
ANALYSIS OF VARIANCE OF POST-ITED CLASS ACHIEVEMENT MEANS SUB-TREATMENTS (48 CLASSROOMS)

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	47	420.775	-	-
Treatments	5	23.373	4.675	.48
Subjects	3	24.701	8.234	.84
Interaction	15	137.821	9.188	.94
Within (error)	24	234.880	9.787	-

APPENDIX H (CONTINUED)

TABLE 10
CLASS MEANS FROM REMMERS SCALE TO MEASURE ANY SCHOOL SUBJECT
PRE-TEST

	TREATMENTS					
Subjects	1	2	3	4	5	Means For Total
English	6.87	7.24	8.28	7.24	6.89	
	8.32	6.62	7.88	7.78	6.62	
	6.21	7.62	7.95	6.77	5.82	
	6.15	7.75	7.30	6.56	7.43	
Mean	6.89	7.31	7.85	7.09	6.69	7.17
Math	5.76	6.61	7.31	7.30	7.70	
	8.12	6.42	7.65	8.22	7.42	
	7.68	7.48	8.30	7.35	7.89	
	6.77	5.91	7.63	7.63	7.71	
Mean	7.08	6.61	7.72	7.63	7.68	7.34
Science	7.78	6.96	7.17	7.64	7.64	
	6.57	6.88	6.38	7.31	7.45	
	7.22	6.60	7.71	8.19	6.87	
	7.37	7.45	6.89	7.62	6.59	
Mean	7.24	6.97	7.04	7.69	7.14	7.21
Social Studies	8.05	7.90	5.74	7.20	6.01	
	6.21	6.71	6.73	7.10	4.62	
	7.19	5.66	6.59	7.29	6.85	
	7.01	7.64	6.07	6.27	6.59	
Mean	7.12	6.98	6.28	6.97	6.02	6.67
Mean for Total	7.08	6.97	7.22	7.34	6.88	7.10 (Grand Mean)

APPENDIX H (CONTINUED)

TABLE 11
CLASS MEANS FROM REMMERS SCALE TO MEASURE ANY SCHOOL SUBJECT
POST-TEST

	TREATMENTS					
Subjects	1	2	3	4	5	Means for Total
English	7.47	8.39	8.27	7.57	7.11	
	8.28	7.06	7.88	7.76	6.75	
	7.20	7.64	8.04	6.71	6.07	
	6.94	6.91	6.87	6.68	6.92	
Mean	7.47	7,50	7.76	7.18	6.71	7.33
Math	7.31	8.01	6.99	7.24	7.46	
	8.01	8.41	7.45	7.70	6.76	
	6.72	8.14	8.40	7.43	6.87	
	7.58	7.21	6.85	7.43	7.84	
Mean	7.41	7.94	7.42	7.45	7.23	7.49
Science	8.27	8.31	7.40	8.05	7.07	
	4.93	8.13	7.07	8.20	7.75	
	7.89	6.98	8.13	7.55	6.65	
	6.60	8.32	7.82	7.99	7.68	
Mean	6.92	7.93	7.61	7.95	7.29	7.54
Social Studies	8.18	8.16	6.68	8.05	8.34	
	6.94	7.91	6.95	7.68	5.17	
	8.02	4.65	7.42	7.33	7.33	
	7.68	7.62	7.64	7.41	7.91	
Mean	7.71	7.09	7.17	7.62	7.19	7.35
Means for Treatment	7.38	7.62	7.49	7.55	7.11	7.43

APPENDIX H (CONTINUED)

TABLE 12
STUDENT ATTITUDES TOWARD SCHOOL SUBJECTS (PRE-TEST) BY TREATMENTS AND SUBJECTS

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	41.85	-	-
Treatments	4	2.24	.56	1.37
Subjects	3	5.19	1.73	4.23**
Interaction	12	9.87	.823	2.01*
Within (error)	60	24.55	.409	-

* Significant at the .01 level

** Significant at the .05 level

TABLE 13
STUDENT ATTITUDE TOWARD SCHOOL SUBJECTS (POST-TEST) BY TREATMENTS AND SUBJECTS

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	40.42	-	-
Treatments	4	2.58	.645	1.22
Subjects	3	.65	.217	.411
Interaction	12	5.52	.460	.871
Within (error)	60	31.67	.528	-

APPENDIX H (CONTINUED)

TABLE 14
STUDENT ATTITUDE TOWARD SCHOOL SUBJECTS (PRE-TEST) BY SUB-TREATMENTS AND SUBJECTS

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	47	24.94	-	-
Sub-treatments	5	.95	.190	.349
Subjects	3	1.90	.633	1.165
Interaction	15	9.05	.603	1.110
Within (error)	24	13.04	.543	-

TABLE 15
STUDENT ATTITUDE TOWARD SCHOOL SUBJECTS (POST-TEST) BY SUB-TREATMENTS AND SUBJECTS

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	47	29.45	-	-
Sub-treatments	5	3.86	.772	1.063
Subjects	3	.48	.160	.220
Interaction	15	7.68	.512	.705
Within (error)	24	17.43	.726	-

TABLE 16
STUDENT ATTITUDE TOWARD SCHOOL SUBJECTS
ANALYSIS OF COVARIANCE (MULTIPLE CLASSIFICATION)

TEST OF SIGNIFICANCE FOR TREATMENTS

Source of Variation	df	Sum of Squares of Residuals	Variance Estimate	F Ratio
Treatments + Within	63	20.11	-	-
Within	59	18.28	.31	-
Treatments	4	1.83	.46	1.48

TEST OF SIGNIFICANCE FOR SUBJECTS

Source of Variation	df	Sum of Squares of Residuals	Variance Estimate	F Ratio
Subjects + Within	62	19.92	-	-
Within (alone)	59	18.28	.31	-
Subjects	3	1.64	.55	1.77

TEST OF SIGNIFICANCE FOR INTERACTION

Source of Variation	df	Sum of Squares of Residuals	Variance Estimate	F Ratio
Interaction + Within	71	26.59	-	-
Within (alone)	59	18.28	.31	-
Interaction	12	8.31	.69	2.24 *

*Significant at the .05 level.

APPENDIX H (CONTINUED)

TABLE 17
MEANS FOR STUDENT-TEACHER RATINGS
FIRST AND LAST CYCLE

TREATMENTS					TREATMENTS				
1	2	3	4		1	2	3	4	
Subjects -- English		Pre		Means for Total			English Post		Means for Total
9	9	7	8		7	9	7	5	
7	7	7	9		9	7	9	9	
8	8	7	5		9	7	4	2	
6	6	8	7		4	4	9	7	
7.5	7.5	7.25	7.25	6.94	7.25	6.75	7.25	5.75	6.94
		Math					Math		
3	8	9	9		2	9	9	9	
6	7	8	8		6	8	8	9	
9	9	6	9		9	9	1	9	
8	9	7	8		7	9	6	7	
6.5	8.25	7.5	8.5	7.81	6.0	8.75	6.0	8.5	7.44
		Science					Science		
8	7	7	7		9	6	8	8	
8	9	8	7		9	9	8	9	
5	9	5	8		5	9	7	7	
1	8	8	9		2	9	5	9	
5.5	8.25	7.0	7.75	7.44	6.25	8.25	7.0	8.25	6.88
		Social Studies					Social Studies		
9	6	9	9		9	1	8	9	
8	9	7	9		9	9	7	9	
7	5	7	9		6	5	5	8	
9	9	9	7		9	9	9	7	
8.25	7.25	8.0	8.5	8.0	8.25	6.0	7.25	8.25	7.69
Means for Treatment									
7.38	6.65	7.69	7.55	7.55	7.13	7.55	8.0	7.40	7.29

APPENDIX H (CONTINUED)

TABLE 18
ANALYSIS OF VARIANCE FOR HAYES REACTION SCALE
CYCLE 1

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	153.86	--	--
Treatments	3	10.55	3.52	1.93
Subjects	3	6.92	2.31	1.27
Interaction	9	20.14	2.24	1.23
Within (error)	64	116.25	1.82	--

TABLE 19
ANALYSIS OF VARIANCE FOR HAYES REACTION SCALE
CYCLE 6

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	372.39	--	--
Treatments	4	8.33	2.08	.421
Subjects	3	11.14	3.71	.753
Interaction	12	57.17	4.76	.966
Within (error)	60	295.75	4.93	--

TABLE 20
ANALYSIS OF VARIANCE FOR HAYES REACTION SCALE
CYCLE 1 SUB-TREATMENTS

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	47	129.48	--	--
Sub-treatments	5	16.86	3.37	1.09
Subjects	3	5.06	1.69	.545
Interaction	15	33.06	2.20	.709
Within (error)	24	74.50	3.10	--

TABLE 21
ANALYSIS OF VARIANCE FOR HAYES REACTION SCALE
CYCLE 6 SUB-TREATMENTS

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	47	257.67	--	--
Sub-treatments	5	47.42	9.48	1.82
Subjects	3	.50	.17	.033
Interaction	15	84.75	5.65	1.08
Within (error)	24	1.25	5.21	--

APPENDIX H (CONTINUED)

TABLE 22
COEFFICIENTS OF REPRODUCIBILITY

HAYES PUPIL-TEACHER REACTION SCALE

Item	First Rating	Second Rating
1	.89	.88
2	.79	.86
3	.84	.89
4	.77	.81
5	.86	.89
6	.80	.81
7	.83	.86
8	.85	.88
9	.87	.88
Average	.83	.86

TABLE 23
MARGINALS

HAYES PUPIL-TEACHER REACTION SCALE

Item	First Rating	Second Rating
1	.76	.72
2	.49	.43
3	.70	.72
4	.53	.64
5	.35	.33
6	.56	.50
7	.49	.54
8	.27	.24
9	.34	.39
Average	.50	.50

APPENDIX H (CONTINUED)

TABLE 24
INTENSITY ANALYSIS
FOR CYCLES 1 AND 2 TREATMENTS 1, 2, 3 AND 4

HAYES PUPIL-TEACHER REACTION SCALE
CONTENT SCORE

Intensity Score	0	1	2	3	4	5	6	7	8	9	Total	Cum % tile
9	7	0	1	0	0	0	0	0	0	70	78	100
8	4	0	1	1	0	0	1	0	55	46	108	98
7	5	2	2	2	0	0	3	35	80	41	170	95
6	7	2	5	2	3	5	15	59	82	51	231	91
5	15	4	7	3	8	20	48	108	52	37	302	85
4	24	8	8	11	35	76	127	143	16	24	472	77
3	37	29	20	48	103	151	170	67	0	5	630	65
2	52	48	78	110	175	155	84	1	0	0	703	48
1	64	85	136	178	135	65	2	0	0	0	665	30
0	91	138	129	92	34	0	0	0	0	0	484	13
Totals	306	316	387	447	493	472	450	413	285	274	3843	
Cum % tiles	08	16	26	38	51	63	75	85	93	100		
Midpoint of Content % tiles	4	12	21	32	44.5	57	69	80	89	96.5		
Median of Intensity % tiles	29.5	17	21.1	25.5	38	49.8	61.9	76.6	90.5	92.9		

APPENDIX H (CONTINUED)

TABLE 25
FOR CYCLE 6 TREATMENTS 1, 2, 3 and 4

HAYES PUPIL-TEACHER REACTION SCALE

CONTENT SCORE

Intensity Score	0	1	2	3	4	5	6	7	8	9	Total	Cum % tile
9	7	0	1	0	0	0	0	0	0	72	80	100
8	3	1	5	0	0	0	0	0	14	42	65	96
7	12	2	1	0	0	0	1	4	29	43	92	93
6	13	7	3	0	3	1	2	8	42	54	133	89
5	18	10	8	2	0	2	21	32	61	34	188	82
4	18	14	3	8	6	9	16	49	44	23	190	73
3	24	20	12	20	30	35	58	51	33	6	289	64
2	31	31	21	34	51	49	70	38	11	0	336	51
1	33	34	62	57	55	80	38	9	0	0	368	35
0	30	62	60	81	69	42	13	0	0	0	357	17
Totals	189	181	176	202	214	218	219	191	234	274	2098	
Cum % tiles	9	18	26	36	46	56	67	76	87	100		
Midpoint of Content % tiles	4.5	13.5	22	31	41	51	61.5	71.5	81.5	93.5		
Median of Intensity % tiles	51.3	32.1	25.13	23.3	29.4	32.1	48.4	63.4	77.3	90.9		

APPENDIX H (CONTINUED)
TABLE 26

COEFFICIENTS OF CONSISTENCY
HAYES PUPIL-TEACHER REACTION SCALE

PUPILS IN TREATMENT 1

Cycles	r	N	Number of Weeks Between Ratings
1 & 2	.75	383	3
2 & 3	.80	429	3
3 & 4	.85	423	3
1 & 3	.72	433	6
2 & 4	.77	435	6
1 & 4	.64	434	9
1 & 5	.64	405	21
1 & 6	.70	405	25
5 & 6	.93	405	3

PUPILS IN TREATMENTS 1, 2, 3, 4

Cycles	r	N	Number of Weeks Between Ratings
1 & 2	.73	1683	3
1 & 6	.67	1475	25

APPENDIX H (CONTINUED)

TABLE 27
LARGE I/D MEANS DETERMINED FROM INTERACTION MATRICES

TREATMENTS					TREATMENTS				
1	2	3	4		1	2	3	4	
Subjects -- English				Means for Total	English				Means for Total
Fall					Spring				
1.40	1.19	.72	.65		1.08	6.67	.43	.49	
2.22	2.29	2.04	1.08		2.25	1.07	.01	.55	
1.50	.83	1.09	4.19		2.13	.41	1.48	5.73	
2.62	2.13	.83	2.64		5.27	2.60	1.24	3.74	
1.94	1.61	1.17	2.14	1.72	2.68	2.69	.79	2.63	2.20
Math					Math				
.66	.36	.72	1.09		.50	.63	.78	1.31	
.70	.42	1.24	3.77		.43	.15	.99	1.51	
.94	.55	.72	.72		1.66	.45	.39	.35	
.40	.49	1.20	1.61		.66	.91	1.32	1.40	
.68	.46	.97	1.80	.98	.81	.54	.87	1.14	.84
Science					Science				
1.58	1.70	1.35	.49		1.20	.36	.95	.61	
.25	.23	.46	.58		.35	.16	.33	.63	
.36	.79	1.10	.41		.42	.56	2.33	.33	
.82	.71	.69	.62		.38	.90	.98	.62	
.75	.86	.90	.53	.76	.59	.50	1.15	.55	.70
Social Studies					Social Studies				
.89	.68	1.67	1.96		.42	.41	1.61	.95	
1.81	.54	.79	.73		.77	.44	1.02	.87	
.43	.35	.60	1.33		1.09	.28	.92	1.87	
1.18	.42	.66	2.15		1.14	.21	.51	1.08	
1.08	.50	.93	1.54	1.01	.86	.34	1.02	1.19	.85
Means for Treatment									
1.11	.86	.99	1.50	1.12 (Grand Mean)	1.24	1.02	.96	1.38	1.15 (Grand Mean)

TABLE 28
SMALL i/d MEANS DETERMINED FROM INTERACTION MATRICES

TREATMENTS					TREATMENTS				
1	2	3	4		1	2	3	4	
Subjects -- English Fall				Means for Total	English Spring				Means for Total
9.09	10.81	14.57	12.47		12.50	67.00	1.72	9.10	
33.89	9.25	4.17	13.63		33.50	14.33	.50	7.17	
3.79	14.60	15.25	7.29		60.00	26.00	34.00	10.57	
2.88	4.89	4.15	11.03		7.62	27.50	44.00	6.54	
12.41	9.89	9.54	11.11	10.74	28.41	33.71	20.06	8.35	22.63
Math					Math				
31.32	15.75	1.54	4.08		11.00	12.00	4.44	7.33	
3.48	10.45	7.45	20.09		4.22	3.75	86.00	68.00	
4.59	4.23	6.29	13.27		9.57	23.50	28.00	28.00	
3.38	1.95	13.23	4.13		3.88	1.95	13.23	4.13	
10.69	8.10	7.13	10.39	9.08	7.17	10.30	32.92	26.87	19.32
Science					Science				
3.80	21.13	16.50	9.84		3.00	46.00	51.00	26.50	
9.62	2.97	5.36	33.90		44.00	21.00	.43	6.86	
3.26	14.59	34.90	15.59		3.83	10.40	32.00	38.00	
11.34	7.55	9.13	15.38		30.00	4.82	17.50	14.33	
7.01	11.56	16.47	18.68	13.43	20.21	20.56	25.23	21.42	21.86
Social Studies					Social Studies				
24.00	21.43	12.88	6.38		11.00	27.00	37.00	21.00	
24.25	9.38	57.00	9.42		5.75	36.00	10.60	55.00	
26.00	8.00	4.09	47.50		17.00	8.00	34.00	28.00	
12.32	8.64	27.67	75.50		4.50	28.00	5.57	16.00	
21.64	11.86	25.41	34.70	23.40	9.56	24.75	21.79	30.00	21.53
Means for Treatment									
12.94	10.35	14.64	18.72	14.16 (Grand Mean)	16.34	22.33	25.00	21.66	21.33 (Grand Mean)

TABLE 29
ANALYSIS OF COVARIANCE LARGE I/D

Source of Variation	df	x^2	xy	y^2
Treatments	3	3.71	2.33	1.84
Within	60	36.63	36.24	97.88
Total	63	40.34	38.57	99.72

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Treatments	3	.81	.27	.257
Within	59	62.03	1.05	---
Total	62	62.84	---	---

TABLE 30
ANALYSIS OF COVARIANCE REVISED i/d

Source of Variation	df	x^2	xy	y^2
Treatments	3	592.14	25.07	657.27
Within	60	10833.03	-4.33	21510.08
Total	63	11425.17	20.74	22167.35

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Treatments	3	657.23	219.08	.600
Within	59	21510.08	364.58	---
Total	62	22167.35	---	---

APPENDIX H (CONTINUED)

TABLE 31
MEANS FOR MTAI
PRE-TEST

	TREATMENTS					
Subjects	1	2	3	4	5	Means for Total
English	171	185	53	56	136	
	104	165	159	169	110	
	189	114	145	115	159	
	108	106	118	114	149	
Mean	143	142.50	118.75	113.50	138.50	131.25
Math	91	107	94	90	78	
	141	160	151	119	107	
	131	111	125	150	126	
	81	118	49	141	154	
Mean	111	124	104.75	125	116.25	116.20
Science	139	133	120	95	128	
	91	179	136	112	166	
	124	122	117	137	157	
	86	101	128	73	103	
Mean	110	133.75	125.25	104.25	138.50	122.35
Social Studies	105	132	105	160	120	
	79	88	133	102	173	
	160	86	160	124	120	
	99	107	75	112	178	
Mean	110.75	103.25	118.25	124.50	147.75	120.90
Means for Treatment	118.69	125.88	116.75	116.81	135.25	122.68

APPENDIX H (CONTINUED)

TABLE 32
MEANS FOR MTAI
POST-TEST

			TREATMENTS			
Subjects	1	2	3	4	5	Means for Total
English	145	181	89	49.34	123	
	127	156	175	164	118	
	164	130	123	91	105	
	96	91	127	118	151	
Mean	133	139.5	128.50	105.59	124.25	126.17
Math	72	81	95	90	90	
	141	154	136	83	102	
	116	83	115	163	140	
	100	139	7	126	178	
Mean	107.25	114.25	88.25	115.50	127.50	110.55
Science	135	101	130	88	143	
	106	174	135	122	147	
	97	139	98	105	148	
	89	133	95	57	107	
Mean	106.75	136.75	114.50	93	136.25	117.45
Social Studies	134	126	80	153	110	
	63	113	110	78	168	
	145	104	161	130	116	
	91	117	57	125	182	
Mean	108.25	115	102	121.50	144	118.15
Means for Treatment	113.81	126.38	108.31	108.90	133	118.08

APPENDIX H (CONTINUED)

TABLE 33
ANALYSIS OF VARIANCE MTAI PRE-TEST FOR TREATMENTS

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	78813.550	---	---
Treatments	4	4059.925	1014.981	.952
Subjects	3	2374.250	791.417	.742
Interaction	12	8418.875	701.573	.658
Within	60	63960.500	1066.008	---

TABLE 34
ANALYSIS OF VARIANCE MTAI POST-TEST FOR TREATMENTS

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	79	88688.70	---	----
Treatments	4	7829.92	1957.48	1.670
Subjects	3	2450.05	816.68	.697
Interaction	12	8114.06	676.17	.577
Within	60	70294.67	1171.58	----

APPRNDIX H (CONTINUED)

TABLE 35
ANALYSIS OF VARIANCE MTAI
PRE-TEST FOR SUB-TREATMENTS

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	47	49531.81	---	---
Sub-treatments	5	6055.94	1211.19	.940
Subjects	3	4358.06	1452.69	1.13
Interaction	15	8204.31	546.95	.424
Within	24	30913.50	1288.06	---

TABLE 36
ANALYSIS OF VARIANCE MTAI
POST-TEST FOR SUB-TREATMENTS

Source of Variation	df	Sum of Squares	Variance Estimate	F Ratio
Total	47	53488.67	---	---
Sub-treatments	5	5931.42	1186.28	.842
Subjects	3	6518.17	2172.72	1.54
Interaction	15	7215.08	481.01	.341
Within	24	33824.00	1409.33	---

APPENDIX H (CONTINUED)

TABLE 37
COEFFICIENTS OF CORRELATIONS

Achievement and Intelligence**	Pre	Post
English and I.Q.	.94	.97
Mathematics and I.Q.	.95	.84
Social Studies and I.Q.	.90	.92
Science and I.Q.	.93	.92
Overall ITED and I.Q.	.86	.90

STUDENT ATTITUDE (REMMERS) AND TEACHER ATTITUDE (MTAI)

Pre	Post
-.07	.10

ACHIEVEMENT AND ATTITUDE

	Pre	Post
Overall ITED and Student Attitude (Remmers)	.41**	.18
Overall ITED and Teacher Attitude (MTAI)	-.14	-.35**

OTHER POST-TEST CORRELATIONS

	r
Student Rating and Teacher Attitude	.28*
Student Ratings and I/D Ratios	-.14
Student Ratings and Principals' rating of teachers	.35**

* Significant at the .05 level.

** Significant at the .01 level.

N=80 for all of the above correlations

APPENDIX I

TEACHER REACTIONS

FROM A STUDY BY FLOYD N. KEIM

FORM I

(To be completed by the teachers who received feedback on teacher-student verbal interaction.)

1. What do you feel were the most rewarding features of this study to you?

2. Has teacher-student verbal interaction analysis provided you with new insights into your teaching and classroom management? _____________ Please give reasons for your answer.

3. a. Do you feel that the one day of training you received in classroom verbal interaction analysis was adequate?_______.

   b. If you consider the training inadequate, in what respect was it inadequate?

   c. In future studies how might the training be improved?

4. a. Do you feel that the observed teacher-student verbal interaction patterns in your classroom were representative of your intentions?___________________.

   b. In what ways were they not representative of your intentions?

5. Do you feel that the presence of observers in your classroom considerably altered the normal or expected verbal interaction between you and your students?______________

APPENDIX I (CONTINUED)

6. a. Do you feel that lesson content (i.e., an introductory lesson on some aspect of literature; review of a unit in biology) influenced classroom management and the verbal interaction patterns exhibited during the observations by the co-investigators?______________

   b. If so, in what ways?

7. a. Did you consciously attempt to change your teaching on the basis of the verbal interaction feedback?________________

   b. If so, in what ways?

8. a. Did you experience difficulty in interpreting and understanding the feedback reports of your recorded verbal interaction patterns?_____________

   b. If so, what could have been made clearer in the feedback reports?

9. Would you have preferred face-to-face feedback rather than written feedback?_____________ Why?

10. Was the time lapse between the observations by the co-investigators and your receipt of the feedback reports too long for you to derive maximum benefit?_________. Please explain.

11. a. Do you feel that the number of times your class was observed was sufficient to provide you with an index of your normal range of teacher-student verbal interaction patterns?_______

    b. If no, how frequently do you feel the observations might have been made to provide such an index?

12. Did the analyses of the teacher-student verbal interaction patterns contained in the feedback reports suggest changes in your teaching behavior that you preferred not to employ?_______ Please explain.

APPENDIX I (CONTINUED)

13. Do you have reservations about the value of verbal interaction analysis as it pertains directly to your teaching situation? _________ Please explain.

14. Do you feel that the verbal interaction patterns in the classroom are related to teaching effectiveness? ________. In what ways are they or are they not related?

15. What factors do you feel limit or control the directness or indirectness of teaching? Please explain.

16. What do you feel was the most annoying or objectionable part of this study? Please explain.

17. From the experience gained from your participation in the feedback study, what suggestions would you make for the improvement of future studies?

18. If you had it to do again, would you prefer not being included in a study such as this? _________ Please give reasons for your answer.

APPENDIX I (CONTINUED)

FORM II

(To be completed by the teachers who received feedback on the Hayes Pupil-Teacher Reaction Scale.)

1. What do you feel were the most rewarding features of this study to you?

2. Do you feel that the benefits of pupil-teacher ratings in improving teaching performance are suggicient to suggest their wide-spread use by high school teachers? _______ Please explain your answer.

3. Of what value to you was knowledge of your students' reactions to your teaching performance?

4.a. On the strength of the feedback reports which contained a summary of the students reactions to your teaching performance, did you attempt to change your lesson presentations? __________

b. If so, in what ways?

5.a. Do you feel that your students' reactions to your teaching were reasonably accurate? __________

b. If not, in what respect do you feel their appraisal may have been inaccurate?

6.a. Do you feel that some students may have been influenced in their judgment by factors other than teaching performance? ____________

b. If you do, please indicate factors.

APPENDIX I (CONTINUED)

7.a. On questions contained in the Hayes Pupil-Teacher Reaction Scale in which your students rated some phase(s) of your teaching performance low, did you change your teaching? ____________

b. If so, how?

8. Do you feel that your class is capable of evaluating your teaching performance? ________. Please give reasons for your answer.

9.a. Did you experience difficulty in interpreting and understanding the feedback reports? __________

b. If so, what difficulty was experienced?

10. Would you have preferred face-to-face feedback by the co-investigators rather than written feedback? ________. Why?

11. Do you feel that the students' rating of your teaching performance is a reliable index of your competency as a teacher? ______. Please give reasons for your answer.

12. From your experience in the study, what did you like the least?

13. What recommendations would you make to improve future studies which employ pupil-teacher ratings of teaching performance?

14. If you had it to do again, would you prefer not being included in a study such as this? ________. Please give reasons for your answer.

FORM III

(To be completed by those teachers who received feedback on the pre-test, subject achievement scores (I.T.E.D.) and pre-test ability scores (T.E.A.)

1. What do you feel were the most rewarding features of this study to you?

2.a. Did receipt of the test scores increase your understanding of your students? ____________.

b. If so, in what ways?

3.a. Was knowledge of the students' test scores influential in changing your lesson plans, presentations, and classroom management? __________.

b. If so, what changes did you make?

4.a. Did your knowledge of a student's test scores influence your guidance and counseling of the individual student in your subject? _________

b. If so, in what respect?

5.a. Did you seek assistance from the guidance department in interpreting the test scores of your students? ___________.

b. If so, what assistance did you receive?

6. Do you feel there is a positive relationship between the test scores of the students and their ratings of your teaching performance? _____.

7. What did you dislike most about your participation in this study?

8. From the experience gained from your participation in the feedback study, what suggestions would you make for the improvement of future studies?

9. If you had it to do again, would you prefer not being included in a study such as this? _______ Please give reasons for your answer.

APPENDIX I (CONTINUED)

Responses to the preceding questionnaires which permitted a yes/no dichotomy are presented by treatment in subsequent Tables of this Appendix. A comparison of the teachers' responses to the yes/no questions contained on the questionnaires and to the same questions asked during the follow-up interviews, revealed that 67 per cent of the teachers changed at least one response from "Yes" to "No" or "No" to "Yes". The mean number of changes in responses for teachers in treatment 1 through 4 was 1.49 with a range of changes from none to seven. The reactions of the teachers to questions which could not be tabulated easily or required further explanation than was permitted by a yes or no response, are presented in narrative form by treatments.

The teachers in treatments 1, 2 and 3 who were selected randomly to receive TEA and ITED test score feedback, in addition to feedback on teacher-student verbal interaction analysis or the Hayes Pupil-Teacher Reaction Scale, generally found that the test score feedback did not add new dimensions to their understanding of their students since results of the schools' systematic and comprehensive testing programs were already available. However, two major advantages of the test score feedback that the teachers reported were: 1. Direct receipt of test score feedback was convenient because it eliminated the necessity for most teachers to go to the guidance office and sift through cumulative records to obtain test score information. This encouraged greater use of the test scores by the teachers to determine the level of material to be used with the class and with individuals and to identify early in the year the students who might need special assistance and direction. 2. It permitted a comparison of TEA and ITED scores to be made with intelligence and achievement scores obtained through the use of tests published by companies other than Science Research Associates (Comparable results were reported by the teachers).

TREATMENT 1

An overwhelming majority of the teachers responded in both the questionnaire and the interview that the most rewarding feature of the study was the knowledge of the students' reaction to their teaching which pointed out their strengths and their weaknesses. Only one teacher felt there was nothing rewarding in the study. The following reactions are representative of the opinions of the teachers to the written feedback reports they received: "It gave me a self-analysis of my teaching and an idea of the students' opinions of myself as a teacher."; "Some of the criticisms, etc., that I wasn't aware of before, suggested changes in my teaching that would improve me as a teacher."; "This (feedback) has helped inspire in me a critical analysis of myself as a teacher,"; "This (feedback) pointed out weaknesses in my teaching that can be corrected. It made me aware of things I was not aware of but students were,"; "I felt the feedback I received certainly helped me in changing my teaching procedures with that group."

Only one teacher in treatment 1 reported a reservation to the widespread use of a student-teacher rating instrument to improve teaching performance. Yet, twelve of the sixteen teachers indicated that their students might have been influenced in their ratings by factors other than teaching performance. Most of the factors mentioned were those which would tend to lower the students' ratings of their teachers. The most frequently recurring factors were: personality differences (reported ten times), marks (reported five times), discipline problems (reported four times) and student attitude toward subject (reported three times). Other factors, that teachers felt may have influenced the student-teacher ratings, included previous failure with the subject, low skills, general scholastic ability, physical classroom conditions, student success in the class, and general reputation of the teachers. In spite of the influencing factors mentioned by the teachers, only three teachers of the sixteen felt that their students' ratings of their teaching performance were not reasonably accurate.

An important aspect of the questionnaire was to determine what effects the written feedback reports have upon the teaching behavior of the teachers as seen by the teachers themselves. Fourteen teachers reported that they changed their lesson presentations. One of the teachers who said he did not change his teaching behavior was the teacher who found nothing rewarding in the study. The student ratings of the other teacher were sufficiently high, in his estimation, to suggest no changes in his teaching behavior. The latter teacher said that if students had not indicated that he was "one of their best teachers" and he had not "presented interesting subject matter," he "would have changed drastically." The specific changes the teachers said they made were: improvements in the conclusions of their lessons, used a variety of teaching methods, made lesson objectives clearer, and provided more detailed explanations and instructions.

Three out of every four teachers in treatment 1 felt their classes were capable of evaluating their teaching performance. Yet only 37 per cent of the teachers felt that their students' ratiangs of their teaching performance were a reliable index of their competencies as teachers. Almost all of these teachers said that the student-teacher ratings provided only partial indices of their competencies and there were other factors that had to be considered. In addition, the teachers who held the opinion that teacher competence can be judged by student-teacher ratings had some reservations regarding the value of student-teacher rating devices and their implications for evaluating curriculum content. The reservations are summarized in the following statement that was given by one of the teachers. "I feel that students are discerning. They are fair and objective. I feel, however, their judgment, as far as curriculum content is concerned, is not infallible by any means. They don't know, at this stage, what they are going to need in the way of preparation in this area."

To a large extent, the teachers' recommendations to improve future studies which might employ student-teacher ratings of teaching performance, were based upon the few aspects of the study that were liked least by the teachers. Two teachers felt that provisions should be made to permit discussion of the written feedback reports with the observers. Two teachers encouraged the elimination of frequent administration of the Hayes Pupil-Teacher Reaction Scale because, "the students disliked answering the same questions." One teacher felt that the students should be better informed about the study and, as a result, the "student-teacher evaluations would be fairer and more objective -- less pointed." It was also suggested that the teachers should be provided with a "printed sheet of suggestions to improve responses for each item on the Hayes Pupil-Teacher Reaction Scale." One teacher recommended that classes of students whose intelligence levels are near average or above average should be used in future studies for "more valid results." Finally, one of the teachers said there should be a follow-up study of the teacher and his classes two or three years from now so that comparisions of ratings could be made.

TREATMENT 2

The sixteen teachers who received written feedback reports on the verbal interactions between themselves and their students were asked to identify what they felt were the most rewarding features of the study to them. Fourteen teachers listed a variety of rewarding features and two teachers reported, "There were very few." On the positive side, two teachers replied that the feedback made them aware that, in some instances, they were doing too much lecturing and more verbal interaction could and should be used. Four teachers reported that knowledge of the amounts of time that were devoted to teacher lecture and interaction were most rewarding. One teacher felt that, "an awareness of what actually is taking place in an intergroup situation," was the highlight of the study. An English teacher said that, "the information, including a breakdown of teacher-student verbal interactions, that was made available, ...was most helpful in making future plans." "Self-examination of my methods of teaching and the attempt to improve them," was listed by another English teacher. A teacher with considerable classroom experience said, "It took me out of some complacency and it presented a new thought process to teaching." A social studies teacher with only a few years of classroom experience said, "This study made me fully cognizant of the type of teacher I am. I learned a lot about analytical questioning and interaction analysis." The most rewarding feature mentioned by a teacher during the follow-up interview was, "the fact that it gave an opportunity for me to concentrate on what I was doing in terms of relationships to the students in the classroom. It made me think a little more clearly about what I was doing because, through the study, I was forced to do this."

All of the teachers in this treatment indicated that teacher-student verbal interaction analysis provided them with new insights into their teaching and classroom management. Essentially, the teachers' replies centered on their recognized need to encourage and obtain more interaction between themselves and their students and to elicit a greater amount of student involvement in the topics under discussion. Better than 80 per cent of the teachers either implied this need or spoke directly of the need to modify their teaching behavior on the basis of the written feedback reports they received. For less than 20 per cent of the teachers, the written feedback reports provided a mirror image of their teaching and classroom management that did not necessarily imply change.

Only two teachers stated that they did not consciously try to change their teaching behavior on the basis of the feedback reports they received. All of the fourteen teachers who reported that they did try to change their teaching behavior said they attempted to stimulate more student-initiated response and participation. Eight of these teachers also said that they tried to give more praise and encouragement to their students. One of the teachers who tried to encourage more student participation in the topics under discussion felt that he was unsuccessful in his endeavor with the observed class but felt that his efforts were more fruitful in other classes in which he tried the same thing. He attributed his lack of success in the observed class to the concentration of "all the quiet, sedate students in this one class."

Ten teachers felt that lesson content was a factor that influenced their classroom management and their recorded verbal interaction patterns. There was general agreement among the ten teachers that there was, and would be, substantially less verbal interaction resulting from the introduction of a new topic. A number of teachers not only considered lesson content as a factor that controls verbal interaction and classroom management, but the background and ability level of the student as well.

Five teachers reported that they had difficulties in understanding the feedback reports of their recorded verbal interaction patterns. The difficulties encountered included the inability to understand the I/D and i/d ratios and the "vagueness of the information" contained in the feedback reports. One of the teachers said that the feedback reports would have been less vague had he "really taken time to study the feedback." It was mentioned that face-to-face feedback would have been helpful since it would have provided an opportunity for discussion and interpretation of the information contained in the mailed feedback reports.

Six teachers had reservations about the value of verbal interaction analysis as it pertained directly to their teaching situation. All of the six teachers felt that verbal interaction analysis was helpful as a yardstick to measure their teaching behavior but that it had its limitations. It was pointed out that there are so many factors which affect interaction, such as the subject area, the topic, the teaching behavior preferred, the ability of the students, etc., that the value of interaction analysis was restricted. A reservation strongly emphasized by two teachers was that verbal interaction analysis could not possibly measure the quality of the interaction and, as a result, its usefulness to those teachers was reduced.

Teachers indicated seven factors which limited or controlled the directness or indirectness of their teaching. The two major factors were the ability of students and the subject matter being taught. The remaining factors were lesson content, experience and flexibility of the teacher, student attitude and interest, amount of material to be covered, and size of class.

In response to the question which asked the teachers what was the most annoying or objectionable part of the study, four teachers found nothing objectionable. However, five teachers said they disliked the teaching schedule disruptions caused by the observations because they had to shift lessons to avoid conflicts with normally scheduled tests, visual aid presentations, laboratory periods, etc.. Two teachers mentioned that they were annoyed by the failure of their classes to respond in a normal manner while being observed. Another two teachers felt they lost rapport with their classes because of the presence of observers. One teacher found frustrating the inability to distinguish good teaching from bad teaching based on the analysis of the verbal interactions.

Only one teacher made no recommendations which might improve future studies that employ verbal interaction analysis feedback. Five teachers emphasized the need to provide more than one day of orientation and training. Four teachers thought similar studies might be improved if the written feedback reports were supplemented by face-to-face feedback. A social studies teacher, whose observed class was below average in ability, suggested that more than one class should be observed so that the different verbal teaching behaviors employed by the same teacher in classes of different abilities could be observed and compared. A mathematics teacher suggested that tape-recording each lesson and randomly selecting lessons for analysis would overcome the "unnatural situation" that develops when observers are present in the classroom. Finally, a social studies teacher was hopeful that future studies would include some method which would permit the quality of verbal interactions to be recorded, measured and reported.

TREATMENT 3

Eleven teachers reported rewarding experiences somewhat similar to those mentioned by fourteen teachers in treatment 2. In general, the teachers were impressed by the analyses of the verbal interactions between themselves and their students which provided them with new perspectives on their patterns of teaching behavior. Five teachers, however, found nothing rewarding in the study and were critical of interaction analysis as a "singular means to improve teaching and learning."

Three of the five teachers who found nothing rewarding in the study also felt that they gained no new insights into their teaching. The remaining teachers listed insights that were similar to those reported by the teachers in treatment 2, i.e., the need to encourage and obtain a greater amount of student verbal interaction in the topics under discussion.

Nine teachers, an increase of four over treatment 2, felt the orientation/training meeting conducted at the outset of the study was inadequate. The major criticisms mentioned were the time limitations which precluded a sufficient understanding of the rationale behind the study and how to interpret the materials used in interaction analysis. To improve the orientation and training of teachers in future studies which might employ interaction analysis, the teachers recommended that the training be spread over two or three days. It was further recommended by three teachers that time be allocated during the school year so that the teachers could discuss with the observers various aspects of the training and the study that were not readily understood.

Seven teachers who felt that the presence of observers considerably altered the normal or expected verbal interactions attributed the non-normal condition to the "goldfish bowl" uneasiness that affected both themselves and their students and to the "clam shell effect" imposed on the students by the presence of observers. An English teacher's comments were representative of the reactions. "An observer in the classroom always results in a slightly altered situation and I feel that I drive the students when there is an observer present. I do this because I think a segment of my mind is devoted to what the observer is thinking. I know the students react differently. As a group they were better behaved and less responsive."

To improve future studies which might employ teacher-student verbal interaction analysis, eight teachers recommended that the participants be given more training and more information concerning the study. Seven teachers encouraged more than three observations per class in order to record the normal range of teaching patterns. Six teachers strongly recommended that consultations or conferences be held between the observers and teachers so that questions concerning the interpretation of the feedback might readily be answered and a complete understanding could result. It was pointed out that face-to-face feedback could serve the same purposes as conferences.

In general the teachers in treatment 3 offered more negative reactions to various aspects of the study and to the feedback they received than did the teachers assigned to other treatments. Yet, in spite of the negative reactions, the teachers praised the study for its beneficial effects upon themselves and their students. A biology teacher's comment is typical of those received: "I've been in this teaching game long enough to know that you sometimes work yourself into a rut and I think that studies like this help you to develop a sharpened edge on teaching."

TREATMENT 4

The most rewarding feature of the study to ten of the teachers in treatment 4 had nothing to do with the feedback they received. Instead, they were favorably impressed by the information they received on teacher-student verbal interaction analysis during the orientation/training meeting at the outset of the study. The remaining teachers felt that the receipt of the test score feedback was the most rewarding feature because it gave them a better understanding of their pupils' abilities and interests.

For the most part, knowledge of their students' test scores was not influential in changing teaching behavior. Eight teachers said flatly that the test scores did not cause them to change their lesson plans, their presentations or their classroom management. Only three of the seven teachers who said they changed their teaching behavior to adjust to the ability of the class could really attribute their changes to the feedback they received. Four teachers who reportedly changed their teaching behavior made the changes as a result of the training they received in verbal interaction analysis rather than the feedback.

APPENDIX I (CONTINUED)

The test score feedback influenced eight teachers in their guidance and counseling of the individual students in their subjects. The guidance and counseling were limited primarily to those students who were unable to achieve to the level expected. In addition, a few teachers said they tried to be more tolerant and helpful to the students who were under-achieving.

Many of the teachers felt that they received insufficient feedback and training to assist them in improving their teaching. Six teachers recommended that more observations be made and that feedback on the student-teacher ratings and verbal interaction analysis be given to the teachers immediately rather than being withheld until the end of the year when the feedback would be of less value. Six teachers suggested that more training would be essential in similar future studies to "absorb and assimilate the material" related to the study. Other teachers recommended that there should be more contact with the observers so that an evaluation of the teaching could be made and they could "discuss methods which would help the teacher."

APPENDIX I (CONTINUED)

TABLE 38

TABULATION OF RESPONSES OF TEACHERS IN TREATMENT I TO FORM II QUESTIONNAIRE (or INTERVIEW) QUESTIONS WHICH COULD BE ANSWERED "YES" OR "NO"*

Question	No. of Teachers Answering "Yes"	No. of Teachers Answering "No"	Other Responses
2.	15	1	-
4. a	14	2	-
5. a	13	2	1 ("some doubt")
6. a	12	4	-
7. a	13	3	-
8.	12	4	-
9. a	4	12	-
10.	7	7	2 ("no preference")
11.	6	7	3 ("not entirely")
14.	2	14	-

*Of the fourteen questions contained on FORM II, ten questions could have been answered "Yes" or "No". As a reliability check of the responses given by the teachers to these ten questions on the questionnaire, the questions were asked again during the follow-up interview with each teacher. Among the sixteen teachers in Treatment I, there was a total of twenty changes in responses from "Yes" to "No" and "No" to "Yes". This averages approximately one change in response per teacher with a range of no changes in responses for nine teachers to a high of four changes for one teacher. Table 39 contains the number of changes in responses from "Yes" to "No" and "No" to "Yes" to questions contained in the questionnaire which were asked during the interview.

TABLE 39

TABULATION OF CHANGES IN YES/NO RESPONSES BY TEACHERS IN TREATMENT I TO QUESTIONS CONTAINED ON FORM II QUESTIONNAIRE THAT WERE ASKED DURING THE INTERVIEWS

Question	Teachers Changing From "Yes" to "No"	Teachers Changing From "No" to "Yes"	No Change
2.	1	2	13
4. a	1	1	14
5. a	1	1	14
6. a	1	0	15
7. a	0	0	16
8.	1	2	13
9. a	0	0	16
10.	1	3	12
11.	2	3	11
14.	0	0	16

APPENDIX I (CONTINUED)

TABLE 40
TO FORM I QUESTIONNAIRE (OR INTERVIEW) WHICH COULD BE ANSWERED "YES" OR "NO"*

Question	No. of Teachers Answering "Yes"	No. of Teachers Answering "No"	Other Responses
2.	16	0	-
3. a	4	11	1 ("did not attend")
4. a	11	4	1 ("not completely")
5.	5	11	-
6. a	10	6	-
7. a	14	2	-
8. a	5	11	-
9.	9	6	1 ("no preference")
10.	1	15	-
11. a	11	5	-
12	0	15	1 ("do not know")
13.	6	10	-
14.	13	0	2 ("not entirely") 1 ("do not know")
18.	3	13	-

*Of the eighteen questions contained on FORM I, fourteen questions could have been answered "Yes" or "No". Among the sixteen teachers in Treatment II, there was a total of 36 changes of responses from "Yes" to No" and "No" to "Yes". This averages approximately two changes in responses per teacher with a range of no changes for four teachers to a high of seven changes for one teacher. Table 41 contains the number of changes in responses from "Yes" to "No" and "No to "Yes" to questions contained in the questionnaire which were asked during the interview.

TABLE 41

TABULATION OF CHANGES IN YES/NO RESPONSES BY TEACHERS IN TREATMENT II TO QUESTIONS CONTAINED ON FORM I QUESTIONNAIRE THAT WERE ASKED DURING THE INTERVIEW

Question	Teachers Changing From "Yes" to "No"	Teachers Changing From "No" to "Yes"	No Change
2.	2	0	14
3. a	1	0	15
4. a	2	2	13
5.	2	1	13
6. a	1	0	15
7. a	1	1	14
8. a	1	2	13
9.	0	2	14
10.	1	1	14
11. a	3	3	10
12.	0	2	14
13.	3	0	13
14.	0	3	12
18.	0	2	14

TABLE 42

TABULATION OF RESPONSES OF TEACHERS IN TREATMENT III TO FORM I QUESTIONNAIRE (or INTERVIEW) QUESTIONS WHICH COULD BE ANSWERED "YES" OR "NO"*

Question	No. of Teachers Answering "Yes"	No. of Teachers Answering "No"	Other Responses
2.	14	2	-
3. a	6	9	1 ("did not attend")
4. a	12	4	-
5.	7	9	-
6. a	12	4	-
7. a	12	4	-
8. a	9	7	-
9.	13	2	1 ("no preference")
10.	0	16	-
11. a	8	8	-
12.	4	12	-
13.	9	7	-
14.	12	4	-
18.	4	12	-

*Of the eighteen questions contained on FORM I, fourteen questions could have been answered "Yes" or "No". Among the sixteen teachers in Treatment III, there was a total of twenty-two changes in responses from "Yes" to "No" and "No" to "Yes". This averages approximately one change per teacher with a range of no changes for five teachers to a high of five changes in response for one teacher. Table 43 contains the number of changes in responses from "Yes" to "No", and "No" to "Yes" to questions contained on the questionnaire which were asked during the interview.

TABLE 43
TABULATION OF CHANGES IN YES/NO RESPONSES BY TEACHERS IN TREATMENT II TO QUESTIONS CONTAINED ON FORM I QUESTIONNAIRE THAT WERE ASKED DURING THE INTERVIEWS

Question	Teachers Changing From "Yes" to "No"	Teachers Changing From "No" to "Yes"	No Change
2.	1	1	14
3. a	1	0	15
4. a	0	2	14
5.	0	0	16
6. a	0	5	11
7. a	2	0	14
8. a	0	2	14
9.	0	1	15
10.	0	0	16
11. a	2	0	14
12.	2	1	13
13.	0	1	15
14.	0	0	16
18.	1	0	15

TABLE 44
TABULATION OF RESPONSES OF TEACHERS IN TREATMENT IV TO FORM III QUESTIONNAIRE (or INTERVIEW) QUESTIONS WHICH COULD BE ANSWERED "YES" OR "NO"

Question	No. of Teachers Answering "Yes"	No. of Teachers Answering "No"	Other Responses
2. a	10	5	-
3. a	7	8	-
4. a	8	7	-
5. a	7	8	-
6.	6	8	1
9.	2	13	-

*Of the nine questions contained on FORM III, six questions could have been answered "Yes" or "No". Among the fifteen teachers in Treatment IV, (one teacher retired late in April because of ill health) there was a total of thirteen changes in responses from "Yes" to "No" and "No" to "Yes". This averages less than one change in response per teacher and ranged from no changes for eight teachers to a high of three changes for two teachers. Table 45 contains the number of changes in responses from "Yes" to "No" and "No" to "Yes" to questions contained in the questionnaire which were asked during the interview.

TABLE 45

TABULATION OF CHANGES IN YES/NO RESPONSES BY TEACHERS IN TREATMENT IV TO QUESTIONS CONTAINED ON FORM III QUESTIONNAIRE THAT WERE ASKED DURING THE INTERVIEWS

Question	Teachers Changing From "Yes" to "No"	Teachers Changing From "No" to "Yes"	No Change
2. a	1	1	13
3. a	1	1	13
4. a	1	2	13
5. a	1	0	14
6.	3	0	12
9.	2	0	14

TABLE 46

TABULATION OF YES/NO RESPONSES OF TEACHERS IN TREATMENTS 1, 2 AND 3 TO TEST SCORE FEEDBACK QUESTIONS ON FORM III QUESTIONNAIRE

	No. of Teachers Answering "Yes"				No. of Teachers Answering "No"			
Question	Treat. 1*	2**	3***	Tot.	Treat. 1*	2**	3***	Tot.
2. a	6	7	3	16	1	0	4	5
3. a	4	2	2	8	3	5	5	13
4. a	6	3	4	13	1	4	3	8
5. a	-	3	3	6	7	4	4	15
6.	3	3	6	12	4	4	1	9

*One teacher reported at the conclusion of the study that the test score feedback that was mailed to him had not been received.

**One teacher misplaced test results before studying them and therefore could not answer the questions.

***One teacher said that he lacked the time necessary to study the test scores of his students and therefore could not answer the questions.